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CONTENTS.

All communications to be addressed:

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POINTS FOR PRODUCERS.

£10,000 Bonus for Clearing Mallee Land.

The Minister of Agriculture (Hon. T. Pascoe, M.L.C.) has intimated that the Government offer a bonus of £10,000 for an effective and economic method of thoroughly clearing, including removal of stumps, &c., of mallee land. A bonus of £500 is also offered for a cheap and effective method of destroying scrub without removing the stumps, &c. Full particulars in respect to the conditions under which these bonuses are offered can be obtained from the Director of Agriculture.

Agricultural Bureau Conferences, 1921.

The first of the Conferences of the Agricultural Bureau for the year 1921 is to take place at Clare, at which centre the Lower Northern Branches meet on Wednesday, February 9th. This is to be followed by the Conference of Upper North Branches, which meets at Orroroo on the evening of Thursday, February 24th, and on the following day. In March the Mid-Northern Branches meet at Gladstone on Tuesday, 8th; the Franklin Harbor District Branches at Cowell on Thursday, March 17th; and the Yorke Peninsula Branches at Kadina on March 18th.

Capri and Smyrna Figs.

These trees have produced splendid crops of large, luscious figs at the Government Experimental Orchard, Berri, says the Manager (Mr. C. G. Savage) in his annual report. If one section of the orchard has received more attention than any other from the public, then it is the fig plot. The Smyrna figs have been dried and packed in 1lb. cartons and placed upon the Adelaide and Brisbane markets, and high encomiums have been passed upon them. These figs have more than held their own when compared with the imported article, both from Turkey and California. Judging by the interest aroused by these fruits, many acres of these figs will be planted during the next few seasons. The returned soldiers, especially, appear to be taking great interest in this new industry. The over-wintering crop of Capri figs at present on the trees containing the fig wasp (*Blastophaga grossorum*) is large, and should assure a numerous brood of wasps for fertilising the next season's Smyrna crop.

Dehorning Dairy Cattle.

The dehorning of dairy cattle is, I find, gaining popularity in this State. Whilst I personally favor the dehorning of the calf as being the better method, I maintain that where dehorning is properly performed it adds, not only to the contented state of the herd, especially when fed at close quarters, but it prevents the possibility of damaged udders by the cows horning one another.—(Mr. P. H. Suter, Government Dairy Expert.)

The Price of a Bull.

Admiral Beattie, a Friesian bull bred in Holland, is reported to have changed hands recently at £7,750. This animal was, according to the *Livestock Bulletin*, imported by the South African Government and sold when fifteen months old for £75. In 1917 he changed hands for £1,000; in 1919 he was bought back by previous owners at £5,000, and was subsequently passed on for £7,750.

Experimental Orchard.

The Government Experimental Orchard, Coromandel Valley, consists of an area of 52¼ acres. Of that area 40 acres are planted with fruit trees. There are 1,624 distinct varieties of apples, 46 varieties of almonds, 17 of loquats, 115 of apricots, 80 of nectarines, 218 of cherries, 49 of nuts, 893 of pears, 34 of olives, 379 of plums, 362 of peaches, 129 of figs, 42 of quinces, 43 of persimmons, and 112 varieties of citrus trees.

Pigs.

Pigs, as has been the case for the past 40 years, are going through the vicissitudes invariably affecting agricultural commodities for which as yet there is no available export outlet; there is an abundance of them in one season, with accompanying low value, and a dearth in them in the following one, with corresponding rise in values. In 1916-17 pigs rose from 66,237 head to 118,542, representing an annual increase of 79 per cent.; in the following year they declined to 110,353, a decrease of 7 per cent.; whilst in 1918-19 they had become reduced to 79,078, an additional fall of 28 per cent. In this connection it is worth recalling that as far back as 1890 we could boast of 116,277 head. This unending rise and fall in numbers and values is exceedingly unfortunate says the Director of Agriculture (Professor Arthur J. Perkins) in his annual report for 1919-20. It has involved more than one farmer in heavy losses, and blocks the way to progress in an industry eminently adapted to local conditions. If we could but establish a definite export market in bacon and ham, the possibilities of expansion are almost unlimited. Prior to the war Great Britain was importing 20 millions sterling worth of bacon and ham from the United States of America and Canada in which labor conditions approximate our own, and in which general conditions are no more favorable than in the Commonwealth. For the present we lack large industrial factories and are without recognition on the markets of the world. It seems almost certain that the offer of a five years' export bonus on bacon and ham would lead to the building up of factories, and with an abundant supply of a first-class article, uniform in character, we should experience little or no difficulty in capturing our share of the world's requirements in this direction. Unfortunately, under the Federal agreement the power to offer special export bonuses has been surrendered by the States and is now the prerogative of the Commonwealth Government, and, for reasons which it is difficult to fathom, the Commonwealth Government has hitherto remained deaf to repeated requests for assistance. And yet the export bonus on bacon and ham, operating over a period of five years, would, beyond question, help to

build up an important Commonwealth industry from which all States alike would benefit. It is probable that under its influence the pigs of the Commonwealth would speedily and profitably pass from 1,000,000 head to 10,000,000 and more, whilst the value of Commonwealth pig exports from a few hundred thousand sterling would soon extend into millions. Members of the Federal Ministry have repeatedly expressed the view that discharged soldiers should be encouraged to take up pig-raising on a large scale. Without an established export market, however, it would, in my opinion, be very unwise that they should do so. From the purely South Australian view point, not only is the expansion of the dairy industry intimately bound up with that of the pig industry, but, in addition, the legitimate development of the secondary cereals is equally dependent on it, and, in a general way, a prosperous pig industry will mean considerably increased production from the farm lands. Hitherto we have failed in such efforts as have been made, both in our own interests and in those of others. Has not the time come for strong combined action?

Tuberculosis.

In his report for the year 1919-20 the Chief Inspector of Stock (Mr. T. H. Williams), states under the heading "Tuberculosis":—The veterinary officers and inspectors of the department dealt with 42 cases affecting dairy cows in the metropolitan area and 23 in the outside districts, a total of 65. Thirteen of these cases were discovered as the result of applying the tuberculin test to 93 cows in dairy herds where manifest cases of the disease had been previously discovered. The test was applied to 152 other cattle, mainly bulls and cows for export to other States; only four animals reacted. Among beef cattle in the country districts the inspectors discovered 23 cases, all of which were killed. At the Abattoirs market and in the metropolitan area 78 beef cattle were discovered with manifest lesions of the diseases, and all were sent to the Abattoirs for slaughter. The majority of these were imported animals. Of 51,533 cattle slaughtered at the Abattoirs under careful veterinary inspection, 264, which includes 120 sent there by the stock inspectors, were found diseased. An instance, which should prove a warning to breeders of beef cattle, has come under my notice. On a station in the north a badly affected bullock was allowed to run with about 200 young animals. About 170 of the latter were slaughtered under inspection at the Abattoirs when 26 were found diseased and several carcasses had to be destroyed. Owners and managers of runs, where beef cattle are bred, should pay close attention to the health of their bulls and breeding cows if they wish to keep their herds free of disease.

Apple Export Trade.

The General Manager of the Government Produce Department has received advices that the Agents-General have arranged with the Imperial Government for space for the export surplus of apples this season. The Department has also been advised that the *Bellana*

sailing about February 26th, will be the first available boat, and growers desirous of taking this opportunity of shipping should apply immediately to the Department for space. The Department's advices are also to the effect that the market prospects are fair for good quality and well packed fruit, and growers are advised to pay particular attention to these matters, as owing to the high cost of freight, the most profitable returns can only be secured when the grower offers the buyers good quality. The fruit will be sold on its merits on an open market as the Food Controller has decided to remove all control of prices after the 31st March.

Imports and Exports of Fresh Fruits, Plants, &c.

During the month of December, 1920, 7,708bush. of bananas, 1,236bush. of fresh fruits, 3 packages of bulbs, 3 packages of seeds, 24 packages of plants, 209 bags of potatoes, and 1,997 empty wine casks were examined and admitted at Adelaide and Port Adelaide and other centres under the Vine, Fruit, and Vegetable Protection Acts, 1885 and 1910. Of these 222bush. of bananas (over-ripe) were destroyed, and 16 empty wine casks were fumigated. Under the Federal Commerce Act, 695bush. of citrus fruits and 5,637 packages of dried fruits were exported to overseas markets. These were consigned as follows:—For London—5,587 packages of dried fruits. For New Zealand—695bush. of citrus fruits. For Batavia —50 packages of dried fruits. Under the Federal Quarantine Act, 9,244 packages of seeds, &c., were examined and admitted from over-sea sources. Of these 2 packages of nutmegs were fumigated.

Publications Received.

The "Chemistry of Crop Production" by T. B. Wood, C.B.E., M.A., F.I.C., F.R.S. It is explained in the preface that the author has "attempted to set out in the form of a connected story the scientific principles of crop production." The published price of the book is 5s. 6d.

ROUP IN TURKEYS.

A form of avian diphtheria, commonly called roup, and unfortunately common among turkeys, especially in the North, has been brought under notice by a correspondent, who reports that he noticed the eyes of some of his birds much swollen and watery. The Poultry Expert (Mr. D. F. Laurie) states that the disease is one that will spread from bird to bird, consequently the first step is to isolate those affected. They should then be given twice daily a teaspoonful of olive oil, to which is added one to three drops each of eucalyptus oil and kerosine, according to the age of the bird. If the face swells and becomes hard, it should be opened with a sharp knife, the cheesy matter evacuated, and dressed with boracic acid powder. A few drops of kerosine should be poured on the surface of the drinking water for all the birds, the flock as well as the sick ones.

INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

[Replies supplied by C. A. LOXTON, B.V.Sc., Government Veterinary Surgeon.]

"G. B.," Shoal Bay, reports (*a*) three-year-old colt on good feed, but does not put on condition; (*b*) two geldings which discharge slimy material from the mouth when working.

Reply—(*a*) Feed three-year-old colt liberally, and give Fowler's solution of arsenic, one tablespoonful twice daily in feed for a fortnight; (*b*) this green slimy froth is saliva stained with food. This abnormal flow of fluid may be due to the presence of any irritation in the mouth. Make an examination of the mouth, teeth, tongue, gums, &c., for the presence of any foreign body, ulceration, injury, etc.

"C. H. A. T.," Borrika, has stallion castrated two months ago, subsequently developing sores on the fetlock, chest, and ribs.

Reply—You can give him a dose of physic as suggested (5 dram physic ball), but prepare him first by giving him only mashes for a day or two before giving him the ball. Apply zinc oxide to the sores, dusting it on liberally two or three times a day. If the flies are troublesome, use the following mixture:—Oil of cajuput, 1 part; olive oil, 2 parts; mix. Paint a little of the preparation round the edges of the sore with a feather two or three times daily.

"C. H.," Halidon, reports (*a*) heifer that refuses to eat; when chewing cud froth comes out of the mouth; drinks well. (*b*) Horse with skin irritation.

Reply—(*a*) Give 1 pound Epsom salts dissolved in quart of linseed tea, with a pint of molasses. After this has acted, give the following powder:—Gentian, 3ozs.; bicarb of potash, 3ozs.; powdered ginger, 3ozs.; powdered capsicum, 1oz; mix. Divide into 12 powders. One given three times a day before feeding, shaken up in a pint and a half water. (*b*) Make up following emulsion:—Water, 1gall.; soft soap, 1lb.; kerosine, 1 pint. Boil water, add soap, mix up into an emulsion, add kerosine, stir till creamy consistence. Apply once every third day for three times.

"A. P. C.," Buccleuch, reports (*a*) horse on good feed, but rapidly losing condition; (*b*) calf four months old, barbed-wire cut on teat; wound has healed well, with the exception of small hole through which the milk escapes; (*c*) horse with strangles.

Replies—(*a*) Put him on a special ration, and give him Fowler's solution of arsenic, one tablespoonful, twice daily, in the feed for a fortnight. (*b*) Heifer with milk fistula; as soon as you have dried her off, try an application of lunar caustic (silver nitrate). You can obtain this in pencil form. Wet the edges and cauterise carefully the "hole" in the side of the teat. (*c*) Strangles. Put him out of work. Isolate him. See that he has plenty of drinking water, but water him with a bucket. Put him on soft food and green stuff if you can obtain it. Give Epsom salts, 1oz. twice daily. Watch for abscess formation under the jaw. If slow in maturing, apply a little red blister. Evacuate the abscess as soon as it points. Keep wound clean, and dress with antiseptic lotion, 1 tablespoonful of carbolic, izal, or phenyl in a pint of water.

"E. W. S.," Rocky Gully, reports horse rubbing and biting itself. Subsequently sores broke out on the legs and the irritation spread to the body.

Reply—I recommend you to apply the following dressing:—Dissolve 1lb. of soft soap in a gallon of hot water, add one pint of kerosine and mix thoroughly. Apply the dressing while warm. Do not allow the horse to stand in the hot sun after applying the wash. Cooper's milk oil fluid is a good and satisfactory dressing. It is used in the proportion of 1 pint to 8galls. of water.

"K. Mc.F.," Port Lincoln, reports cow which is giving blood in the milk of one quarter.

Reply—This was due to the rupture of a small blood vessel, probably caused by a blow on the quarter. It will gradually clear up without any special treatment. You can use the milk from this quarter as soon as it is free from blood.

"O. S.," Forster, has cow which gave premature birth to a calf four weeks ago, and a good clearance was effected, but in the last few days the cow has lost condition and the milk yield has decreased considerably.

Reply—It is not quite clear whether the present illness is due to the abortion. You can only determine this by examination of the genital passage. If something has been retained, or there is a foetid discharge, &c., it will be necessary to douch her out daily with permanganate of potash solution. Use about half a teaspoonful to three or four gallons of water. Use a short piece of rubber tubing or ½in. garden hose and a funnel. You should continue the douching until the fluid coming away is the same as that being injected. Afterwards depress the end of the tube so as to syphon out any fluid remaining in the cavity. Give her a flat teaspoonful of quinine with a little treacle twice daily on the tongue. If there appears to be no trouble in this region, try the following treatment:—Give her Epsom salts, 1lb.; treacle, 1 cupful; warm water, 1 quart; and follow with powdered nux vomica, ½ teaspoonful; powdered carbonate of ammonia; 2 teaspoonfuls in a pint of water with a cupful of treacle twice a day.

"H. B. W.," Hartley, reports filly with a deep depression running up and down each shoulder blade.

Reply—This depression is due to wasting of the muscles of the shoulders, and is commonly known as slipped shoulder. It is often seen in young horses. Apply daily some mild stimulating preparation, such as soap liniment. Give course of massage. It may be some time before any improvement takes place. Put her in a small paddock where she can get walking exercise.

"A. R.," Mundalla, has draught gelding with large lump on throat about 4 or 5in. below the ear, also yearling colt with two lumps on the throat.

Reply—Put the draught gelding out of work, foment the swelling in each case daily with warm water, or else apply a small quantity of red blister, rubbing it in well over the swellings. Watch for abscess formation, and as soon as you can feel the swelling pointing make an incision in the skin, or continue the foments so as to hasten evacuation. When the abscess has burst or has been opened, keep the wound clean and see that it drains out effectually. It would be advisable to keep both of these cases apart from your other horses. Give them each 2ozs. Epsom salts daily in the drinking water, which may be given in a bucket. Supply them with soft feed, mashes, &c.

"T. B. N.," Milang, reports horse with swollen knee. The swelling appears to contain fluid, which moves about when rubbed with the hand.

Reply—This swelling may be described as capped knee and is due to an injury of some kind, probably a kick. In the early stages frequent foments are useful. You can give it plenty of massaging. Apply the following ointment; rub in a little daily:—Iodide of potash, 1 part; lanoline, 8 parts. Swellings of this kind do not readily respond to treatment and may leave a more or less permanent thickening.

"H. H. W.," Keith, reports filly with an old standing injury to the hock, but which has not caused lameness.

Reply—You should first wash the whole of the exterior of the joint with warm water containing a little washing soda. Detach and remove any loose or dead pieces of tissue, and when the outside is thoroughly cleansed, syringe out all the wounds with a disinfectant solution such as carbolic acid, cyllin, izal, or kerol; 1 part to 40 of water (one tablespoonful to a pint). You will find a household enema syringe useful for the purpose. Use a pickle bottle to hold the disinfectant, and you will be able to dress the wounds without assistance. Do not use any force in inserting the nozzle of the syringe, but syringe the wounds out thoroughly. Dress twice daily and report again in a week.

"A. R.," Yankalilla, reports six-year-old gelding received kick on the hock. Small wound formed that is discharging matter, and joint is swollen.

Reply—The mare has had an open joint. Injuries of this kind are always serious, causing alterations in the joint and often resulting in stiffness of the joint and chronic lameness. You must not lance the swelling. If there is any heat in the part give frequent irrigation of cold water. This is best applied by allowing the hose to run over the hock for half an hour two or three times daily. When the heat has quite disappeared you could apply a blister composed of red iodide of mercury, 1 dram; lard, 1oz.; but do not blister the front of the hock where the flexion takes place.

"W. E. W.," Woodside, has calf with round scabs, about size of a penny, on the skin.

Reply—The calf has ringworm. You should wash the scabs off with warm soap and water and apply the following preparation with a brush every two or three days:—Tincture of iodine, Stockholm tar, equal parts; mix.

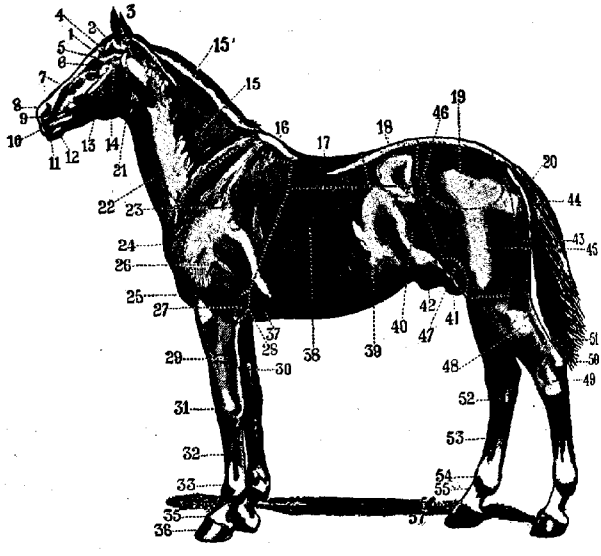


Fig. 1.—Exterior of the Horse: Side View.

REFERENCES.

1 Forehead.
2 Forelock.
3 Ear.
4 Supra orbit.
5 Eyebrow.
6 Eye.
7 Nose.
8 Nasal Peak.
9 Nostril.
10 Upper Lip.
11 Lower Lip.
12 Chin.
13 Cheek.
14 Temple.
15 Neck.
15 Crest.
16 Wither.
17 Back.
18 Loins.
19 Croup.
20 Tail.
21 Throat.
22 Cervical Groove.
23 Shoulder.
24 Shoulder Point.
25 Breast.
26 Upper Arm.
27 Elbow.
28 Point of Elbow.
29 Forearm.
30 Chestnut.
31 Knee.
32 Canon.
33 Fetlock joint.
34 Pastern.
35 Coronet.
36 Foot.
37 Brisket.
38 Chest.
39 Abdomen.
40 Flank.
41 Testicles.
42 Sheath.
43 Buttock.
44 Point of Buttock.
45 Thigh.
46 Haunch.
47 Stifle.
48 Leg or Gaskin.
49 Hock.
50 Point of Hock.
51 Tendo Achilles or Ham-string.
52 Chestnut.
53 Canon.
54 Fetlock joint.
55 Pastern.
56 Coronet.
57 Foot.

DEPARTMENTAL DOINGS.

Amongst the Agriculturists.

During the month of January the Director of Agriculture (Professor Arthur J. Perkins) attended the Congress of the Australian Association for the Advancement of Science, and delivered the Presidential Address in the Agricultural Section. The Director had occasion to visit Werribee Experimental Farm, and he expressed himself as being much impressed with the work done recently. The first quarterly meeting of the Murray Bridge Herd Testing Association was also attended by the Director.

Dairying, &c.

The Assistant Dairy Expert visited farmers and factories in the Balaklava, Melrose, Currency Creek, Strathalbyn, and Nuriootpa districts.

Horticulture.

The Horticultural Instructor (Mr. Geo. Quinn) visited Melbourne, and attended a conference convened by the Federal Government, having for its object the setting up of standards to be applied to apples and pears exported from Australia.

Mr. Quinn also attended a meeting of citrus growers of the Torrens Valley, held at Athelstone, and discussed with them a scheme put forward by Inspector Trimmer for the treatment of red scale infested orangeries, from the Gorge down to Paradise. The idea of the scheme was to leave no affected patches after the operation, with a view to restricting the spread of the scale over a longer period in the neighborhood.

The Cygnet River Branch of the Adelaide Bureau was visited by Mr. C. H. Beaumont (Orchard Instructor). Mr. Beaumont also visited a number of fruit growers on Kangaroo Island. Subsequently he expressed the view that there were great possibilities before this district for fruit production, provided a market could be arranged for.

Farm Buildings, &c.

In the matter of rendering assistance to farmers in the erection of their buildings, the Field Engineer (Mr. J. Paull) has supplied plans of dairy buildings to Messrs. Johnson Bros. of Wingfield, and plans of an overhead concrete tank to Mr. G. H. Mann, of Mannum.

AGRICULTURAL EDUCATION IN AUSTRALIA.

[Presidential address delivered before the Conference of the Australasian Association for the Advancement of Science by ARTHUR J. PERKINS, Director of Agriculture in South Australia.]

I should deem myself wanting in proper feeling if I did not take the first opportunity to express my high appreciation of the honor done me in nominating me to the position of President of this section of the Australasian Association for the Advancement of Science. I have given a lifetime to the practice of agriculture and to a study of some of its problems, and it is gratifying to find that my efforts have been thought worthy of this recognition. On my part, I must hope that the choice of my subject-matter, and my way of handling it, may not lead to avoidable disappointment.

From the outset, and perhaps to my shame, I shall confess to insufficient acquaintance with the general procedure of the Association, and particularly as to the limitations which may be supposed to compass the subject-matter of Presidential addresses. On taking thought, however, it has seemed to me that in this matter the only reasonably limiting factor should be adequate personal knowledge of the subject brought up for discussion; and, whether legitimately or not, I have endeavored to act on this view. For twenty-two years I was directly engaged in the teaching of agricultural subjects; for ten years I was Principal of an Agricultural College; and for the past six years my daily avocations have kept me in close touch with all that concerns agricultural education and training. In the circumstances, I have felt that if not qualified to speak on Agricultural Education, then it would be extremely difficult to name another subject within closer range of my capacity.

It may, perhaps, be objected that, given the subject, there was little call for a display of special claims to competency; that, after all, like the weather, education, and particularly agricultural education, is one of those topics concerning which everybody feels naturally competent to express an opinion; and, if so, why not I? There is the rub; it is all so beguilingly simple. We see around us carpenters, doctors, blacksmiths, lawyers, chemists, farmers, &c.; we feel that in the world there must be a constant demand for them, or, at all events, for some of them. Statisticians will even go to the length of telling us the ideal proportion which each one of these callings

should bear to the population as a whole. Hence, the apparently logical inference that all education and training should be so managed and directed as to satisfy these material wants of the community, and the natural corollary that the shoemaker need not be given ideas above his last, nor the farmer above his plough. Again, apart from innate gifts, we know competency in any art or vocation to come to the individual as the result only of long personal application and experience; and that lifetime is usually too brief a span for perfection, if such can exist, in any one of them. And, in the circumstances, will not competency, if not perfection, be attained soonest and with the least waste of energy, if all those foredoomed by birth and statistics to carpentry, law, or farming be seized upon in their tender years, and given, by early education and training, that special twist which leads ultimately to competence in carpentry, law, or farming? And thus by a flawless line of argument we are led unerringly to the avowed goal of our cradle-specialists, and of those who pin their faith to the superior educational value of exclusive and intensive training in single utilitarian subjects.

Does this logical conclusion satisfy our native instincts as to what is meet and right? Much, I suppose, depends on our mental attitude towards life. Happiness, as such, may not form an essential feature in life; nor with any degree of plausibility can it be described as its main objective. Happiness, nevertheless, is a good thing, and surely not to be despised by wracked humanity. There may be, or probably one should say there unquestionably are, ample grounds for rational happiness in the contemplation of a task well and faithfully done, and quite as much, again, in the actual doing of it. Nevertheless, here as well as elsewhere, monotony can kill happiness quite as effectively as hostile intent; and however great the measure of his success, no man is so constituted as to be able to repeat unintermittedly the same task without loss of zest. He must relax at regular intervals, or fail in his mission in life; and has it not been well said that the true test of the value of education is not so much to be seen in working hours as in those of leisure. If, then, an early course of specialised training will produce soonest technically satisfactory carpenters, lawyers, and farmers, will it also produce the type of citizens of whom we shall have most reason to be proud?

I find myself insisting on this question of leisure, because if the lonely evening hours be taken into account, the isolated agriculturist of Australia has probably more of it on his hands than the more gregarious classes of men: hence, in my view, no scheme of education for the agriculturist will be complete, or even morally acceptable, that

does not take these empty hours adequately into consideration. I am of those who believe that the key to the present is to be found in the past; and that it is only the mentally atrophied who refuse themselves occasional use of it. If we wish to take an intelligent interest in the problems of the day, we cannot afford to overlook what time has sifted from the records of the past. For these reasons, then, and because I believe that we are called upon to be good citizens, first and foremost, and craftsmen afterwards, I am of the opinion that the son of the agriculturist should not be indelibly labelled from his earliest days; that up to his fourteenth or fifteenth year his education should be general rather than special; and that every effort should be made towards reducing the educational disabilities under which he labors relatively to his more fortunate city-bred cousin. Had I the time, and were it essential to my main theme, I could labor this point at considerable length; I could show that much of the unrest which is driving the country youth citywards is not unconnected with inadequate educational facilities. My main purpose to-day, however, is to discuss technical training as such, and I must rest satisfied with having indicated the foundations on which I believe this training should rest.

Is the State justified in making special provision for the technical training of those whose future occupation it will be to till the soil and tend flocks and herds, supplying thereby the rest of the community with the means of subsistence, and, incidentally, in this country, with our main articles of export? The mere posing of this question may possibly jar the sensibilities of some educationalists; in the end, however, difficult issues are better met squarely rather than avoided ostrich fashion. Doubtless, it is sufficiently obvious that we cannot hope to-day to have competent physicians, chemists, engineers, etc., without adequate outside provision for their training; but is it equally obvious of the agriculturist? I think not; but not because of fundamental differences in the nature and scope of his occupation, but rather because of special circumstances in his life which do not obtain in other occupations. It is thus that the professions are no longer hereditary and personal, as in earlier times they were more or less wont to be; and in the main, the practice of them is a thing quite apart from the ordinary routine of family life. Because a man is a physician or a lawyer, it does not follow that his children shall acquire even rudimentary knowledge of medicine or law. With the agriculturist, on the other hand, see how different are things. He belongs, in the first place, to one of the few callings from which modern conditions have been unable to eradicate the hereditary

principle. Apart from personal predilections, in the great majority of cases a man becomes a farmer because he was born and bred on a farm; because his father owns a farm or farm plant and material which in the course of time he hopes to inherit and put to good use. Again, the farm-bred lad, even if he wished it, cannot hope to escape the all-pervading influence of the paternal occupation; from his earliest days it meets him on all sides; his boyish interests centre around it, and his usual earliest ambition is to take a man's share in it. True, with many, ere manhood is reached, farm life comes in time to pall, particularly when parents are injudiciously exacting or over-grasping. In the main, however, the groundwork of technical training may be said to surround the farm lad at home, and to force itself upon his notice from his earliest days in favorable or unfavorable light. In the circumstances, therefore, can we wonder that the great bulk of those following agricultural pursuits are in the main home-trained, have always been home-trained, and will probably always be home-trained? Nor is this a fact wholly peculiar to our own special conditions, but rather is it universal in its application, wherever agriculture happens to be practised. Moreover, under conditions such as ours, the usual scantiness of available labor, and the usual agricultural incompetence of much of it that is at times available, serve to tighten the father's grip on the farm-bred lad who has reached the age when outside technical training becomes possible; and however tempting the future advantages which this training seems to promise, the exigencies of the present will in most cases continue to bind the lad inexorably to the farm.

Now, although from these incontrovertible facts certain obvious conclusions would appear to flow in logical sequence, we have still to allow for the deflecting weight of considerations of another order. It may, for instance, seem logical to conclude that because the average farm-bred lad is unable to benefit directly from technical training provided by Agricultural Colleges and the like, institutions of the kind are more or less superfluous; but can this honestly be said to be so? Has such experience as we have shown it to be so? Again, I think not; indeed, it would not be difficult to show that the influence of Agricultural Colleges on general agricultural progress has been very far from negligible, and from the viewpoint of the State, this is the factor that counts. If it be true that the average farm lad is unable to take full advantage of what they have to offer, exceptional ones are able to do so, and, and, indeed, do do so to a greater extent than is generally suspected. In this connection, I shall draw special attention to the callings of the parents of students who have attended

the Roseworthy Agricultural College, and which can be summarised as follows:—

Agricultural Callings—			
Farmers	110		
Pastoralists	54		
Vinegrowers	18		
Fruitgrowers	14		
Dairymen	4		
Market gardeners	2		
	—	202	= 35.2%
Non-Agricultural Callings—			
Business men	238		
Civil servants	62		
Professional men	61		
Artisans	11		
	—	372	= 64.8%
		574	100.0

Apart from a few earlier names, the occupations of which I have been unable to trace, 574 families have supplied Roseworthy College with students since its inception in 1883. Out of this total, 202 families, or 35.2 per cent. were earning their livelihoods in agricultural callings which have been indicated in detail. Hence, 202 purely agricultural families, frequently represented at the College by more than one son, have realised the advantages of special technical training, and through their sons have availed themselves of it. That these country lads have benefited personally and individually from this training we can have little doubt; indeed, as one who, in the past, has had much to do with them, I can undertake to vouch for the fact. They have had their outlook on life broadened; they have been made familiar with new and unsuspected lines of agricultural practice; they have been taught to look beneath the surface and to master the broad principles underlying narrower home practice; and the torch they have received has eventually been carried far and wide throughout the scattered agricultural districts of the State. And it is this last point—the indirect advantages which country workers derive from Agricultural Colleges—which I wish specially to stress.

It is only in very extraordinary circumstances and in very exceptional times that the State has much to gain from a complete revolution in agricultural practice; normally, beneficial changes must come slowly and progressively. For the most part local conditions deter-

mine what at the time is and is not economically possible, and the common sense and inherited instincts of agricultural workers adopt that line of operations which appears to correspond to the requirements of the times. The progressiveness of any district can usually be assessed by the extent to which its average practice approaches more or less to that of the most successful men in the district, who may be looked upon as the local torch bearers. Experience shows, too, that those are most sensitive to the promptings of progress whose educational outlook is broadest; and whilst it must be admitted that the technically trained are no more exempt from failure than others, it may safely be assumed that for the most part their local influence will be in the direction of progress rather than of reaction; that this is so has frequently come under my notice in various parts of South Australia. Hence, I submit that whilst for the bulk of our rural workers special technical training, as distinct from home training, is neither necessary nor, indeed, possible, from the State viewpoint; the existence of institutions in which this training is imparted is amply justified so long as they can succeed in attracting a sufficiency of those who by precept and example are able in later life to influence their districts for good. For the latter the task will be very much simplified wherever they have the assistance of local associations of agriculturists for mutual self-improvement, such as the Agricultural Bureau system, so successfully practised in South Australia for the past 33 years

These remarks refer mainly to the sons of agriculturists who are able to take advantage of special technical training; and their leavening and missionary work is of sufficient national importance to justify the existence of Agricultural Colleges. We must not, however, overlook the claims of those city families who contributed students in the proportion of 65 per cent.; on consideration, it will perhaps be found that this contribution alone affords ample independent justification for the existence of these Colleges. We hear on all sides the emigration of country units to the cities deeply deplored; but little or nothing is said of the counter-current from the cities towards the country. And yet its direct and indirect influence on the development of the country is incalculable. It brings with it, as a rule, the investment of new capital in rural ventures; the infusion into them of the spirit and enthusiasm of the neophyte; the introduction of city business methods and enterprise, and the breaking down of social barriers between town and country. All this is clearly to the good, and much to the advantage of the country, and, incidentally, of the State. It is therefore no exaggeration to affirm that it is not possible that en-

deavors to attract city-bred lads to the country should be overdone. Many, it is true, will, when they can, first seek to serve an apprenticeship on a well-conducted private farm; others, less wise in spite of maturer years, are prepared to go on the land fresh from the counter. The latter may, and often do, eventually make good; but usually at what expense of time and money in the quest of personal experience! More sound and certain, however, is the future of those who are able to make of an Agricultural College easy stepping stones to their new and unfamiliar occupations; and for the latter purpose alone the State would be well justified in maintaining these Colleges as half-way houses between town and country.

How can technical training be imparted to best advantage at an Agricultural College? This is a question upon which opinions are apt to differ much, and it would seem that in individual concrete cases we cannot escape the influence of expediency and of local conditions. At all events, we have no right to imply that others are wrong because in such matters they do not do as we do. In Europe—and I believe this to be so in America also—the student's familiarity with ordinary farm work and operations is taken for granted, and the course of training is arranged accordingly. Hence, the paramount importance of theoretical instruction at the expense of actual practice, which, if not wholly banished, is very much in the background, and confined to periodical outdoor class demonstrations of brief duration. If we are to assume that all those in attendance are sons of agriculturists, familiar with farm operations from their infancy, this arrangement undoubtedly has its advantages. It leaves free for theoretical training much precious time which would otherwise be devoted to manual operations. The necessity of surrounding the College with a large and expensively equipped farm does not arise, and funds are freed for more thorough scientific and technical equipment. Finally, the number of students in attendance is no longer limited by the means available for adequate experience in manual operations, but merely by house and class-room accommodation.

In Australia this practice has not hitherto found favor; and since the Australian system originated at Roseworthy, and was passed on subsequently to Dookie and Hawkesbury, I may be pardoned for illustrating my points from that institution, with which I am best acquainted. In the matter of a general course of training, our Australian Agricultural Colleges have run counter to the European point of view; they have concluded—and rightly so, in my view—that in the absence of adequate acquaintance with general farm practice, all theoretical instruction must continue more or less futile; they have

found that the average student does not possess this acquaintance, and they have modified the curriculum accordingly The fact that over 64 per cent. of those in attendance at Roseworthy are town-bred would appear to vouch for the soundness of this attitude. Hence, to every College has been attached a large and well-equipped farm, the manual operations of which are carried out almost entirely by students under competent supervision. Usually the student's work-time is divided into two equal parts; one-half (preferably alternate days) is given up to theoretical instruction and demonstrations, and the other to seasonable farm work. It follows, therefore, that familiarity with farm operations and practice is made to go hand in hand with theoretical instruction, of which it may be taken to represent the best possible form of practical demonstration. I have been privileged to watch the results of this type of training for close on 30 years, and can testify that in the main it has not fallen short of the anticipation of its originators. It is certain that under no other course of training could the unavoidable interval which must always separate the successful student from the successful farm manager be bridged in a shorter space of time. Like all other human undertakings, however, it is not without its limitations and inconveniences; and because in the past it has served us well, it does not follow that future developments may not render imperative the adoption of drastic modifications. If the means of acquiring a reasonable degree of familiarity and skill in farm manual operations is to be available to all students in attendance, then it is very clear that the number of those present at any one time must be strictly limited by the farm area which can be conveniently worked from a common centre. From personal experience I am prepared to assert that from this viewpoint, whilst 60 to 70 students represent perhaps an optimum, 100 of them represent a clear maximum. If under the pressure of circumstances this maximum be over-stepped, one of two things is bound to happen: either the College farm is too vast and unwieldy to be conveniently managed from a common centre; or else it cannot possibly meet the continued requirements in farm practice of all those in attendance. Hence, as soon as requests for admission to these Colleges threaten to lift numbers in attendance appreciably and consistently above the maximum, then, if our faith in technical training is genuine, and if we shun make-believe, either new Colleges must be called into existence, or else the system of training hitherto adopted at existing ones must receive radical modifications. With out limited population and shifting political conditions, the multiplication of Agricultural Colleges is for the present, in my opinion, neither wise nor desirable. The efficiency of these Colleges is mainly dependent on their equipment

and the extent to which they are supported by the public purse; and if, on a wave of passing enthusiasm, their numbers be incautiously increased, not only recent creations, but old-established institutions as well, must suffer when its force is spent and the inevitable ebb sets in. Better no Colleges at all than half-starved ones. We must consider, therefore, along what lines existing systems of training admit of modifications without sacrifice of their proved efficiency.

And in this connection it is certainly not necessary to assume that all those seeking College training are inadequately acquainted with farm practice; it may, indeed, be taken for granted that the 35 per cent. who are farm-bred are already adequately equipped in this direction. Not infrequently, indeed, I have heard farmers objecting to send their sons to College on the grounds that half their time would be wasted in doing things with which they had been familiar from earliest childhood. Hence, without loss of efficiency in the course of training, the maximum number of students could be raised, if outside farm training were limited to the inexperienced, whilst the training of farm-bred lads would be restricted to theoretical instruction and associated demonstrations. It may occur to some that the practice frequently adopted in the training of engineers, namely, the suspension of diplomas or qualifying certificates until such time as proof can be given of adequate post-graduate practical experience, might with advantage be extended to agricultural students without earlier farm experience, and thus do away altogether with any attempt to combine both theoretical and practical training. This would bring us back to the European viewpoint, which, in my opinion, is open to very grave objections. Personally, after long experience, I am satisfied that what value there is in theoretical instruction in agricultural subjects is heavily discounted in the absence of personal experience of farming practice. It is literally impossible adequately to impress upon students the bearing and value of principles underlying practices of which they are in complete ignorance. It is no better than attempting to teach chemistry without a laboratory; the only possible atmosphere in which such instruction could bear fruit—the farm atmosphere—would be wanting. In the circumstances, much as one must deplore any break in a boy's educational years, it would be better that the city-bred lad should spend a couple of years on a farm before entering College, rather than that, fresh from school, he should enter an Agricultural College imparting theoretical training only, and trust to acquiring farming practice after the completion of his course of studies.

In summary, then, the policy of exempting farm-lads from farm work would throw open College doors to far greater numbers than can in present circumstances be admitted in complete good faith. Numbers would then be limited by housing and class-room accommodation only—limiting factors which present no insuperable difficulties. This division of students into two distinct sections—those taking a theoretical course only, and those combining with it ordinary farm work—will undoubtedly complicate College management somewhat; the attendant difficulties, however, should not be beyond the power of competent control.

In connection with these suggestions I foresee a possible danger. There may be those who, on the score of economy, or on any other grounds, may think that because it is open to city-bred lads to acquire the requisite farming outlook by working on a farm prior to entering College, the College farm should gradually disappear, or be reduced to moderate-sized pleasure grounds. Against this view, if it be raised, I must enter a most emphatic protest. In this matter it is not merely the ability of the College to impart practical training that is in jeopardy, but what is of even greater importance, the efficiency of the technical staff for teaching purposes. However great his original competency, no agricultural teacher who is not in daily contact with agricultural operations can hope to avoid gradual deterioration; he finds himself divorced from the realities of his subject, and his teaching is bound to suffer proportionately. The great practical efficiency of the Australian Agricultural Colleges has been very largely built up on their farms, and nothing but harm can come from meddling with them.

I should perhaps draw attention here to the obvious fact that the adoption of these suggestions would practically double the time available for the technical training of those exempted from farm duties. At Roseworthy, the present normal course of training extends over three years; but, since one-half of the students' time is taken up with farm work, from the point of view of theoretical training it cannot be said to be equivalent to more than an 18-months' course. And from long personal experience, I can vouch for the cramping influence of existing arrangements on the scope and effectiveness of the training imparted. Hence, those who are freed from the ties of farm work will be given the opportunity of delving more deeply into their subjects than is at present possible.

What becomes ultimately of former Agricultural College students? There are sceptics who assert that the majority of them are to be found in the cities. With a view to settling this point I have

endeavored to analyse the position in so far as it affects former students of the Roseworthy Agricultural College, and the results of my investigations may be summarised as follows:—

Agricultural Occupations—		
Farmers	380	
Pastoralists	27	
Vinegrowers	27	
State agricultural services	23	
Fruitgrowers	22	
Agricultural businesses	12	
Market gardeners	2	
Foresters	1	
	—	494 = 89.8%
Non-Agricultural Occupations—		
In business	24	
Professional men	15	
Civil servants	13	
Artisans	4	
	—	56 = 10.2%

The above analysis concerns 550 students; it is not a complete list—there are still 92 to account for, some of whom are dead. There is, however, no reason to believe that these absentees would appreciably modify the ratio of 9 to 1 in favor of agricultural occupations, and thus may be set at rest the suspicion that Agricultural Colleges are not providing the country with a reasonable quota of settlers.

The Universities of Sydney, Melbourne, and Perth have not hesitated to found Chairs of Agriculture, and acts of private munificence have laid upon the University of Adelaide the obligation to follow in their wake. Nevertheless, even thus late in the day, it may still be asked whether as a community we are as yet sufficiently advanced to make provision for agricultural training of a higher order than is usually available at typical Agricultural Colleges. In America, under a far more favorable set of conditions, the difficulty seems to have been met by incorporating Agricultural Colleges into local Universities. And, on consideration, it is questionable whether a more logical and appropriate solution could have been devised. To both sections it promises continuity of policy, coupled with control by a competent governing body; it obviates "overlapping," and therefore insures economy of effort and resources; and, moreover, it forestalls stagnation and aloofness, which are apt at times to sterilise academic teaching. This rational arrangement has not hitherto been adopted in the Commonwealth. It is true that the University of Adelaide recognises Rose-

worthy technical training to the extent of accepting it as definite part of the degree course in Agriculture; whether, however, this policy will be continued in the future, when a Chair of Agriculture has been definitely established, is perhaps open to doubt. Whatever may be the case, it seems to me that sooner or later we shall have to face squarely the question as to whether there is yet room in the Commonwealth for both Agricultural Colleges and University Chairs of Agriculture; and we shall then find that Agricultural Colleges have spread their roots too deeply in our midst to have much to fear for their future, but will it be possible to say the same of the Chairs of Agriculture? Ultimately, as in economics, it is very largely a question of supply and demand that is involved; if there is an adequate flow of candidates for the higher training, then public sentiment will probably support the Universities. Apart, however, from an infinite minority, the supply of candidates is bound to be limited by the careers open to those in possession of higher training, and during the present generation, at all events, this is not likely to go beyond positions offering on the technical staffs of Government Departments. However much one may recognise the great importance of the work in the hands of these technical departments, it is highly questionable whether standing alone it can be said to justify the existence of four separate Chairs of Agriculture in the Commonwealth. On the other hand, it cannot be too frequently reiterated that teaching is no more than one-half of the functions of a University Chair, and that if at times teaching duties are light, then there is the greater leisure for research. I could say much under this heading, but time presses, and I shall content myself with the statement that in a country such as ours, given adequate and competent research work into matters agricultural, were there not a single student in attendance, the four Chairs of Agriculture of the Commonwealth would have amply justified their existence. In this connection, however, I feel it incumbent upon me to remark that the mere creation of a Chair of Agriculture does not necessarily give rise to those special conditions which render sustained agricultural research at all possible. After all, the practice of agriculture is not a science in itself, but an art; it is nevertheless obviously dependent upon most of the branches of scientific knowledge for a correct interpretation of its principles and for investigations calculated to lead to improvement and material progress. Hence, agricultural research may be described as hydraheaded, and unless to the Chair of Agriculture is attached an adequate scientific staff, the powers for good of the Professor of Agriculture will be very seriously limited, and they will disappear altogether if he is divorced from the realities of things and denied the active direction of agricultural operations. It would be almost easier

to imagine a successful chemist who is denied access to laboratory and chemicals. Nor, if we have any regard for the fitness of things, will purely "titular" appointments to the Chair be tolerated; if we aim at opening out a trench we choose a shovel, not a silver spoon. I hold, therefore, that given the absolute dependence of Australia upon her agricultural and pastoral resources, University Chairs of Agriculture are by no means superfluous, providing we see to it that they have the means to give adequate effect to one of the main functions of all Universities.

But as we well know, *ars longa, vita brevis est,* and neither education nor training cease with the age of irresponsibility; rather do they become intensified in the storm and stress which await us beyond the shelter of teaching institutions. The isolation of country occupations tends to cut off individuals from their fellows, and to this extent clogs progress; particularly is this the case in a sparsely settled country such as our own. And since the State is very intimately interested in the success or failure of these isolated individuals, the task of endeavoring to keep them abreast of the times has come to be recognised as a legitimate line of State activity. To this do we owe our Agricultural Departments, with their staff of expert officers, whose business it is to keep in touch with those in need of advice. Among wealthier communities full advantage, I believe, has been taken of improved modern advertising methods, with the avowed object of striking fire from even the dullest imaginations. We hear of special trains travelling from district to district, carrying with them experts and their laboratories, cinema operators, models, livestock, &c. No doubt these methods, which are as yet foreign to us, are productive of good in congenial surroundings, and although they savor somewhat of revival meetings and travelling shows, it is to be hoped that their influence will prove less evanescent. Nevertheless, for our own special conditions I know of no more effective means of reaching the tiller of the soil than what is known as the Agricultural Bureau system, established in South Australia since 1888. Under this system, agriculturists scattered all over the State are grouped together into local Branches; of these there are to-day 212 in existence, aggregating 5,350 members. These Branches may be said to exist for the mutual improvement of members and for the advancement of the agricultural industries of the district. They hold regular monthly meetings, at which questions of general and local moment are discussed; once a year they attend combined district meetings and the central Adelaide meeting; they make arrangements for visits, addresses, and demonstrations by officers of the Department of Agriculture; they control field trials; they carry out experimental work, in co-operation with the Department; and locally their social

influence is very considerable. I look upon the rapid adoption of superphosphates in Australian farming as one of the most telling revolutions in practice of recent times; to South Australia alone it has already been worth between 25,000,000 and 30,000,000 sterling. It received its first impetus in South Australia, and had it not been for the Agricultural Bureau system, would probably still be struggling ineffectually against prejudice and ignorance. And very much the same can be said of the introduction of spraying among fruit trees and of most other minor improvements adopted within recent times. In brief, then, whilst his daily avocations will continue and complete the agriculturist's training, such personal experience as he may acquire is necessarily limited by his isolated environment; it is essential to the State that he be kept in touch with the progress of the outside world, and in my view this can best be done by organising all agriculturists on the lines so successfully followed in South Australia.

I have submitted for your consideration a few ideas on agricultural education and training; I have made the infant my starting point, and closed with the experienced adult. It follows that in the time at my disposal I can have done no more than glance at a few aspects of the problem which circumstances had rendered familiar to me. I know that to-day we live in an age of revolutionary ideas in matters educational; nevertheless, personally I abide by the old tried ways, believing that a thorough education is the birthright of every one of us, and deprecating specialisation and technical training until such time as the mind has been adequately developed in other directions. From the standpoint of a teacher of technical subjects of 22 years standing, I am prepared to assert that those students are most satisfactory whose preparatory education has been most thorough, most general, and not those whose undeveloped minds have been set a-dabbling with so-called utilitarian subjects. Hence, I claim for country children broad educational opportunities, approximating those usually available to the city-bred. I uphold our Australian Agricultural Colleges as institutions of infinite value to the State, but I believe that without loss of efficiency their sphere of usefulness could be enlarged by the modifications which I have suggested. I can have faith in University Chairs of Agriculture, providing the incumbents are not segregated from the world and the general practice of agriculture, and providing they are allowed adequate means for independent research. And finally, as the coping-stone to all education and training in a community that is mainly agricultural, I believe it to be both the interest and the duty of the State to maintain at the disposal of the rural community adequate means for general self-improvement, both moral and material.

HAND-FEEDING OF STOCK.

Mr. I. J. Warnes, of "Wahroonga," Kooringa, a member of the Leighton Branch of the Agricultural Bureau, recently made a tour around the world. He was granted a commission to inquire into the hand-feeding of stock in Great Britain and America, and has transmitted to the Government the following report thereon:—

"Before I left home to see some other parts of the world, if there was one thing more than another in which I was interested—not even excepting my own calling—it was the hand-feeding of sheep. Living as I do in one of the picked spots of South Australia, experience has shown that during spring, summer, and autumn there is generally plenty of natural feed, but even here, during May, June, and July, sheep usually have a bad time; feed is very short and scarce, and the weather cold and wet; wool does not seem to grow, and all stock certainly lose their condition—in fact, it may be said that sheep only exist.

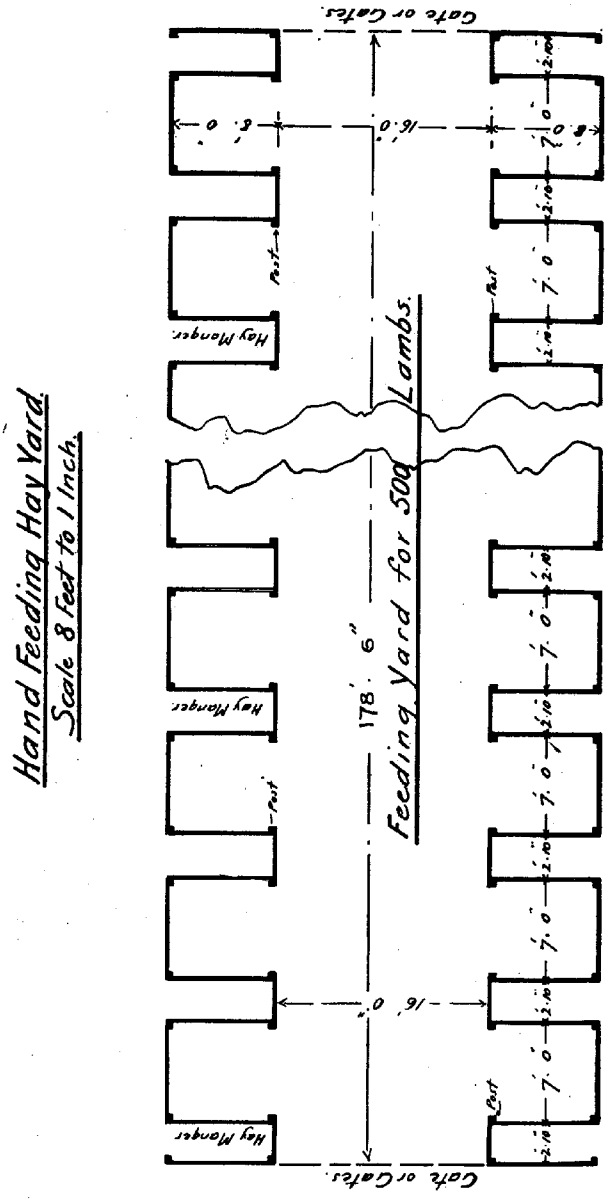
I have always been convinced that this could be remedied, but the best method of doing this was not easy to find. I am now quite satisfied, from what I have seen in my travels, that Australia, and particularly South Australia, should never be without fat meat, and that extreme high or low prices should not exist, as a regulated supply of fat stock could always be available. This can be brought about by hand-feeding, as I have seen it practised in other lands. Lucerne hay, barley, oats, and wheat can be grown or easily procured in most places. This being so, it is only necessary to start on correct lines and go ahead, and I am satisfied that even for a man in a small way, hand-feeding will be a good thing.

A Universal Practice.

I have read a good deal about hand-feeding since my return, and, whilst the various ways suggested are all right so far as they go, I am satisfied that the best method has yet to be learned. Hand-feeding is carried on more or less in every country I visited; but, after a few words as to methods adopted in England, I will pass on to the United States of America, as I consider that what is being done in that country could also be done in Australia, and no doubt with as good results.

In England, turnips, mangles, beet, and other root crops are used for feeding stock. In winter this is carted to a field and fed on the ground, and the sheep eat as much or as little as can be got. A farmer tries to make his own supply of roots last out the season. If he has a plentiful stock of roots, his stock have a good time, and if not, it is otherwise.

In America I found hand-feeding universal, and carried out on commercial lines, and was practised every day all the year round. I soon learned, in conversation on the trains, that most of the producers



Hand Feeding Hay Yard.
Scale 8 Feet to 1 Inch.

Plan.

could give me useful information, which I was only too ready to hear. I met some very fine men, who, upon learning that I was an Australian, and off the land, spared neither time nor money in arranging that I should see all that I wanted in the matter of hand-feeding. I was strongly advised to leave my set route, and to go 300 miles out of my way, so that I might get into the lucerne country, where I would see thousands of sheep being hand-fed throughout the year.

It may be a surprise, but, nevertheless, a fact, to hear that in America 100,000 sheep, 40,000 pigs, and as many cattle are yarded and sold nearly every day. These seem big figures, but such figures are to be seen daily on the saleyard boards. Now, nearly all, if not the whole, of this stock is hand-fed.

Dry Feeding.

Different methods are adopted, such as feeding all stock in the same way as pigs are fed on sugar beet, but the dry-feeding method was that which I liked best, as more suited to Australia, and, in fact, was more general, than any other in America. I should say that at least 75 per cent. of those engaged in hand-feeding used this method. The ration consists of dry lucerne hay and maize, and if maize is not procurable, then barley, oats, or wheat will do. For lambs, the ration would be lucerne hay 1½lbs. and 1½lbs. of maize for the first 30 days; this is increased to 2lbs. of lucerne hay and 2lbs. of maize. On this scale 90 to 120 days should fatten most lambs. If too much grain is given the lambs throw it up, and this making them ill, puts them off their feed for days, hence it will be seen that great care must be taken.

All the lambs are yarded out in the open, and notwithstanding the fact that snow was on the ground a foot or more deep, when I was there, and had been so for weeks, no covering is provided. Straw bedding is continually provided in the yards, which is replaced with fresh straw as required. The old straw, which is quite broken up when removed, forms a valuable manure, and at most yards a good heap was noticeable.

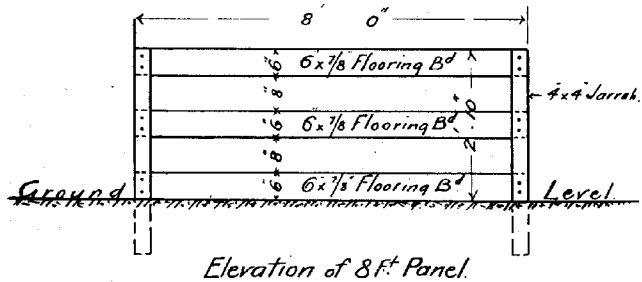
All feeders were of one opinion—that the most convenient number of sheep for each yard would be 500. I saw 6,000 in one set of yards, but all were in bunches (this is American for our mob or flock) of 500.

A yard to hold 500 should be 160ft. long by 32ft. wide. Along the centre lengthwise is an open race 16ft. wide, the feeding mangers being spaced 7ft. apart, projecting at right angles from the fence on each side towards the centre; these mangers being 8ft. long and 22in. wide, making 21 mangers on each side, or 42 in all, and these are fixtures. The yard and hay-feeding mangers, 2ft. 10in. high, all made of flooring-boards. The bottom board is on the ground, then a space of 8in., another board, another space, then the top board. All the yards are made in movable sections.

Hay is got ready and placed around on the outside of the fence so as to be readily accessible, having been first weighed, so that the

exact quantity is used—that is, 1,000lbs. for 500 lambs. In this hay-yard the lambs live night and day, except for the time they are in the grain-feeding yard, which is only 10 or 15 minutes. Water is provided in a trough about 12ft. long, and is always available. The corn-feeding yard is placed near the corn-house. Here the lambs are fed out of troughs 16ft. long and 12in. wide. These troughs are reversible, and have a depth of 3in. on either side. They can be turned over, and so a dry trough is always available. When in position they are 16in. off the ground. The grain is measured exactly, and placed in the troughs. When ready, the gate of the hay-yard is opened, and the lambs at once rush to the corn-yard, where sufficient room must be provided so that each lamb may get to the feed at once. The greatest essential, I am told, is regularity and punctuality; the corn-yard must be ready to the minute. The lambs will remain very contentedly in the hay-feeding yard, but if kept waiting here only a few minutes, will crush towards the gate, and trouble will arise. One feeder kept a yard of lambs waiting ten minutes for me to see the effect. During that time some of the lambs got down and were trodden on; this naturally unsettles them. I was assured by one feeder that punctuality was equal to one-third of the feed.

Hand Feeding Hay Yard.



Elevation of 8ft Panel.

While the lambs are eating the corn, the hay is placed in the mangers in the hay-feeding yard, and as soon as the corn is eaten, the lambs rush back to the hay-feeding yard. The hay is fed only once daily, and, in consequence, towards corn-feeding time the lambs will eat up even the sticks of the hay.

I have tried to explain the method of feeding as well as possible, but if I have failed to make myself understood, I shall be glad at any time to explain to anyone more fully than I have here described.

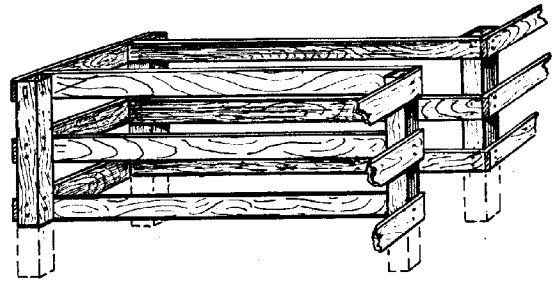
The lambs are well sheltered by the hay in the mangers and by the hay around the yards. When I visited the yards I saw from 500 to 6,000 in sets of yards, and altogether about 30,000 in three hours. One man can easily look after 1,000 sheep. The yards I saw 6,000 in were looked after by three men. It is this great hand-feeding

system which keeps the American freezing works continually at work. I learned that each freezing works had usually from 5,000 to 6,000 lambs, in case of a short supply. In America mostly young meat is eaten; that is, under a year old. Hand-feeding is a material help to the breeder.

BREEDERS AND FEEDERS.

The ranchman shepherds his sheep, keeping for the most part ewes and lambs only. The lambs are sold to the feeders at about five to six months old, and are usually poor, or, at the best, what we term store condition. The feeder buys on quality, all sales being by live weight. This is a wonderful get-out for the breeder, as he has a ready market for both fat and store lambs, which gives him opportunity to spell his run (ranch).

Hand Feeding Hay Yard.



Sketch of Hay Manger.
Not to Scale.

America has from 10 to 20 million sheep continually being hand-fed, with cattle and pigs in proportionately large numbers. Mr. Kidman said he saw 20,000 tons of lucerne hay in one place. He could have said 50,000 tons, and not be over-stating the quantity. A feeder first travels around to ascertain the quantity of hay he can buy. Having purchased, it does not matter if it is 100 miles from home, he sends his portable yards and corn with his lambs to where he has bought the hay. The seller of the hay usually finds accommodation for the feeder for about three months. From this, it will be seen that the grower of the hay is not the feeder. An American informed me that you cannot fatten on hay alone; grain must be used and the stock must be yarded. The yard is very important, and, indeed, this is the most important item in hand-feeding.

The type of yard I have described is that in general use, and I should be only too glad to show anyone how it is erected. This type has been in use from 15 to 20 years, and experience has only

confirmed its utility. The lambs are graded according to condition, and are sold off at all times when considered fat.

In all feeding yards a few pigs are kept. These clean up the grain that may be spilt, and they also eat any sheep that die; and with the best of care there are always some deaths.

As previously stated, all stock in America (and in some parts of England) is sold by live weight on large weighbridges, taking from one to 300 at a time. American sheep as a whole are an indifferent lot; all breeds are mixed indiscriminately. I am confident that, with all the hay that can be grown along the Murray, Australia should never suffer as much as is the case during times of drought.

Should anyone interested in hand-feeding be going to America, I would gladly give him the addresses of some gentlemen who would give them all the information available on this important system. I was advised, after having seen their system, to experiment as to the best method and quantities of feed most suitable to the climatic conditions in Australia.

In conclusion, may I just emphasise one or two points. Grain must be fed with hay. It is useless to try and force the fattening of lambs. Regularity and punctuality are essential. And yarding is probably the most important factor."

FLAX GROWING.

Four members of the Mount Barker Branch of the Agricultural Bureau recently visited Victoria. These were Messrs. H. N. Bell (Chairman), J. Pope, B. Stephenson, and J. E. Smith, B.Sc. (Hon. Secretary). The purpose of their visit was to gather information relating to the cultivation of flax. These representatives presented to the Branch a lengthy report on the subject of their mission.

By way of introduction it was mentioned in the report that the internal conditions prevailing in Russia (which prior to the war produced 80 per cent. of the world's requirements of flax fibre), Belgium, and France had resulted in a shortage of supply, and consequently an increase in price of seed and fibre. To encourage home production, the Commonwealth Government had guaranteed for the years 1920-1922 a price of £5 per ton for all flax fibre of standard quality grown in Australia and delivered to the nearest mill.

CULTURAL PRACTICES.

Investigations revealed that flax was grown in Victoria in districts having an average annual rainfall varying from 24in. to 40in. At Sale, with a rainfall of from 24in. to 26in. per annum, land capable of producing good crops of oats or potatoes was considered suitable for flax.

Soil Preparation.

Emphasis was laid on the necessity for carefully preparing the seedbed. The practice recommended was to plough deeply, and afterwards reduce the soil to a fine tilth. To keep the land clean of weeds was of the utmost importance, because weed growth not only checked the development of the flax, but reduced its value. A level surface to the land was advisable; that enabled the crop to be cut close, ensuring a greater weight, and making the operation of cutting easier.

Manures.

The general practice was to manure the land with bonedust, or a mixture of ½cwt. each of bonedust and super per acre. A practice of some growers in the Drouin district was to grow the flax without manure, on land that had been previously cropped with rape, heavily manured, and fed off with sheep. "Market garden manure," one grower intimated, tended to cause a growth too rank, with the result the crop went down. Manurial tests were being conducted, but up till the present only one year's results were available. The opinion was gathered, however, that in the centres visited, dressings of ammonia, soda, or potash were detrimental to the flax crop, in that the resultant growth of the weeds appeared to be more vigorous than that of flax.

Seedings.

The general method of sowing the crops was to distribute the seed through the wheat side of the ordinary drill. If the tubes were lifted, and the seeds were allowed to fall on a board, they were thus broadcasted; or the seed might be broadcasted by hand. The time for sowing was from mid-April to early May; a point to be borne in mind being that the longer the crop was growing the better the quality of the fibre. Growers appeared to prefer April seeding because the seed germinated better, and strongly rooted and firmly established plants were developed before winter; also a taller crop, less liable to damage by caterpillars, was secured. Frost only appeared to affect the flax when it was in flower. For fibre and seed, a seeding of from 60lbs. to 65lbs. per acre was usual, but if the objective were seed only, half that quantity would suffice. The seed should be lightly covered, and if wet weather intervened when the plants were about 3in. high, the crop might be lightly rolled. A light harrowing at that stage might be an advantage.

Weeding.

To ensure a clean crop it was necessary to pull all tall-growing weeds, such as wild turnips, mustard, dock, thistle, &c.

Harvesting.

Harvesting was commenced when most of the bolls had turned a golden-brown color. The crop was usually cut on a hot day, and some farmers made it a practice not to cut before 10 a.m. Sheaves should be small, well butted, and tied near the heads. They were fit to cart nine or ten days after being stooked, and could then be stacked for an indefinite period.

PRIMARY MANUFACTURING PROCESSES.

Threshing.

The sheaves, after having been carted to the mills, had their upper parts passed between rollers, which crushed the bolls, and thus released the seeds, which were conveyed to a winnower and cleaned. The crushed bolls were used as cattle food, and appeared to be much in demand, for the chaff contained green and soft seeds. About 3cwt. of chaff (saleable at £3 per ton) was yielded by each acre of flax.

Retting.

Retting (*i.e.*, the separation of the fibres from the woody parts of the plant) was the next process. Two methods were practised in Victoria, viz., water retting and dew retting. Water retting was practised at Sale with excellent results. The flax was placed in pits about 50 yards long, 5ft. or 6ft. wide, and 3ft. or 4ft. deep, and lined with sleepers. Some sheaves not too tightly packed were placed in an upright position; others were laid horizontally across. Galvanized steel fencing wire, weighted with railway sleepers, and stretched from end to end, kept the sheaves down. Water was pumped into the pits from a neighboring lagoon. When the process, which took from 19

to 21 days, was completed, the pits were drained through plug holes by gravitation. After the sheaves had drained, they were stood on the cut end, spread out to dry, and then carted to the factory.

Flax was dew retted by being spread out in a thin layer in long rows on a grass paddock. The process generally occupied five or six weeks, during which period the flax had to be turned once or twice to ensure even retting. The process depended on the weather. The labor involved was considerable—cartage, unbinding, spreading, turning, gathering, retying, and back cartage to the mill.

The conclusion reached was that water retting was the better plan, provided suitable water was obtainable. The water needed to be free from iron and mineral salts, which tended to discolor and injure the fibre. The process involved much less handling than dew retting; the flax was a better color, and the operation could be controlled.

The time generally chosen was summer and autumn; the winter months were avoided, and the crop, if necessary, finished off in the spring.

Breaking and Scutching.

The flax was then submitted to the operation of breaking, which consisted of passing it through fluted iron rollers, which reduced the woody portions of the plant to sufficiently small pieces to enable them to be fairly readily beaten away from the fibre. If over retted, fibre was driven off with the woody portions. The flax then passed on to a scutcher, a wheel 4ft. to 5ft. in diameter, with six beaters. That, turning at about 300 revolutions per minute, removed the woody portions. After scutching, which was done once or twice, according to requirements, the flax was ready for bundling, baling, and marketing. Short ends and waste material from the scutching machine were passed through the tow devil, which teased it, and made it fit for use by upholsterers as rough tow. Short ends of fibre picked from the floor were classed as fine tow.

RETURNS.

The following statement of returns for the 1918 crop was quoted as a demonstration of the payable nature of flax culture:—

Grower.	Area. Acres.	Yields. T.	C.	Gross Value of Crops. £	s.	d.	Gross Return per Acre. £	s.	d.
Orr Bros., Dalmore	10	26	8	138	10	0	13	17	0
Traymore & Robbins, Buln Buln	12	29	10	151	4	0	12	12	0
A. Rose, Sale	12	26	2	135	12	0	11	3	0
E. R. Morton, Drouin	31	61	9	307	6	0	9	18	0

The Government guarantee for the 1918 crop was £5 per ton for standard flax. The first payment for the crop was at an average rate of £4 13s. 6d. per ton, equal, on the average, to £6 4s. 8d. per acre. An additional dividend since paid raised the average return to £8 18s. 6d. per acre, and a further dividend, which would bring the figure up to £11 13s. 4d. per acre, is anticipated.

The spring months of 1918-19-20, it is pointed out, were *exceptionally* dry—the flax returns suffered correspondingly.

CONCLUSIONS AND RECOMMENDATIONS.

In conclusion it is intimated that the delegation is of opinion that if the farmers of the Mount Barker district would raise sufficient capital, say, £1,000, either to build a mill for themselves, or sufficient to build a mill with the assistance of a Government loan, the flax industry would pay the growers handsomely. They estimate that with an area of 300 acres under flax, sufficient to run a small mill, growers could look for a return for the crop equal to £12 per acre; or, in the event of a distribution of mill profits amongst growers, up to £18 7s. 6d. per acre. Only on a co-operative basis, however, do they recommend that farmers should take up the industry.

"Given normal conditions," they conclude, "we are convinced that Mount Barker district has the land suitable and the rainfall necessary to make the flax-growing industry a very paying concern. Also, the same would apply to any other part of the State with similar conditions. If mills were established through the hills, they ought to be and would be a source of wealth to the growers, and a means of finding employment for six or seven men at each mill throughout the year."

ENCOURAGING OLIVE TREE PLANTING.

SUGGESTED REGULATIONS RELATING TO THE AWARD OF SPECIAL BONUS.

1. Subject to conditions indicated below, the Government is prepared to pay over a period of ten consecutive years a subsidy of 10s. per annum over every new acre brought under olive trees.

2. Such offer shall continue open and of full effect until specifically withdrawn by notice in the public press: provided always that all those who may have acquired rights under the present offer, and who continue eligible for additional subsidies, shall not forfeit these rights by any such withdrawal.

3. Those wishing to take advantage of these subsidies must first give notice of the fact to the Director of Agriculture not less than 12 months prior to the intended planting season, specifying clearly both locality and area which it is intended to plant.

4. On receipt of such notification, the Director will cause the locality to be examined and reported upon, and if it is found to be suitable to the purpose he will recommend to the Minister that the applicant be accepted as eligible for the subsidies.

5. Thereupon, and in due course, the applicant shall proceed to prepare the land on lines indicated to him in writing by the Director, and these in the main will consist of early winter ploughing and subsoiling to a depth of not less than 15in. and subsequent treatment of the land as well worked bare fallow until planting season.

6. Land, in the course of preparation for the planting of olive trees, will be visited from time to time by an officer of the Department of Agriculture, and, if on the 31st March he is able to report that all prescribed conditions have been complied with, the applicant will be recommended for the first year's subsidy, which, however, shall not be paid until the young trees have been definitely and satisfactorily planted out.

7. If, on the other hand, the officer reports that conditions have not been adequately complied with, and that, in his opinion, the land is not in fit condition to be planted with olive trees, no recommendation for subsidy shall be made, nor shall future subsidies for the same land be allowed if, notwithstanding this adverse report, the applicant persist in planting it to olive trees without the expressed sanction of the Director.

8. In this matter it will always be open to the applicant to appeal to the Minister against the decision of the Director, and the Minister's decision shall be final in the matter. No appeal shall be valid, however, that is lodged subsequently to the starting of planting operations.

9. Once a first year's subsidy has been granted to an applicant, the nine subsequent subsidies are one and all conditional on a favorable report from the Director on the 31st of March of each consecutive year to the effect that all prescribed conditions hereinafter described have been well and faithfully carried out.

10. The forfeiture of a subsidy in any one year for neglect or any other cause will not necessarily disqualify the applicant for future subsidies to which he might otherwise have been entitled: provided that, on the report of the Director, the Minister is satisfied that the applicant has since made adequate amends, and provided that the producing powers or the life of the trees have not been materially injured, and on the definite understanding that no subsidies can or will be paid after the lapse of ten consecutive years.

11. No subsidies shall be granted for olive trees planted as hedges or for groves containing less than four rows of trees.

12. Although, as a rule, the growing of intercalary crops to the rows of olive trees will not be permitted, in districts of heavy rainfall, the Director may on application made, and if he considers it wise, agree from time to time to the growing of specified crops under approved conditions: provided that he is satisfied that the young trees have taken definite root, and provided that such crops do not come within 5ft. of the rows of trees and do not hinder tillage operations around them.

13. All areas to be planted must be duly fenced off and adequately protected from livestock and vermin, to the satisfaction of the Director prior to starting planting operations.

14. The general conditions binding on those who have been allowed a first year's subsidy may be summarised as follows:—

(*a*) The trees planted must be of varieties approved of by the Director, or if seedlings or wild olive trees are planted out, provision shall be made to graft them to approved varieties in such manner and at such times as the Director may indicate:

(*b*) The distances apart at which the trees are to be spaced and the nature of planting operations shall be indicated in writing by the Director, and the work shall be subject to the inspection of an officer of the Department of Agriculture:

(*c*) In the second year of subsidy, and in all subsequent years, all tillage and cultural operations shall be carried out on lines indicated in writing by the Director:

(*d*) In the third year of the subsidy, and as long thereafter as there may be occasion, all blank spaces in the planted areas arising from failure or death of trees shall be duly filled up by the applicant at the planting season immediately following:

(*e*) The shaping and pruning of the trees during the whole period of subsidy shall be carried out by approved pruners on lines indicated by the Director, and, if necessary, under the supervision of an officer of the Department.

15. Failure to comply adequately with any one of the above conditions will, on the recommendation of the Director, lead to temporary or permanent forfeiture of subsidies.

16. Any difference of opinion which may arise between the applicant and the Director shall be referred to the Minister whose decision shall be final.

ORCHARD NOTES.

[By C. H. BEAUMONT, Orchard Instructor.]

The principal work is the picking of the fruit for market; there is room for great improvement in the methods usually adopted and better results might be obtained thereby. Kerosine buckets are useful at times, but they are too big for fine quality peaches to be picked into, or indeed any soft fruit. If possible, fruit should be cooled before being packed, and graded so that soft and hard fruit may not be mixed, and also that varying sizes may be separated.

No fruit should be wasted; if it is too ripe to pack, dry it; the dried fruit will bring as much as the fresh.

Bulletins are available giving instructions on the drying of all varieties of fruit, and also for preserving and bottling.

Diseased fruit should not be allowed to rot under the trees as this means a sure increase of the disease in the future.

If you intend to increase your orchard this year, order your trees as early as possible.

EXPORT OF APPLES.

Growers, who are not experienced in packing for export, should consult Bulletin No. 98, or ask that an instructor should demonstrate how the work is done.

IRRIGATION.

When it is necessary to water fruit trees, it is well to give them a good soaking, and afterwards hoe or cultivate the ground; cultivation is most important.

TETANUS.

Tetanus, says the Assistant Government Veterinary Surgeon, is due to the Bacillus Tetanus gaining access to the body. The common mode of infection is usually through a wound. The source of infection is usually earth, street manure, or stable manure which contains bacilli and spores. When these gain entrance through a wound tetanus is produced. The entrance of foreign bodies, such as splinters of wood contaminated with soil or dust containing organisms; cobwebs, hay dust, may also prove carriers of infection. Prevention is obvious from the above facts. Do not neglect wounds, especially punctured wounds; also examine for foreign bodies in wounds, afterwards treating with suitable antiseptics, as carbolic acid solution. Pricks in the foot, crupper abrasions, saddle galls are commonly associated with the disease. Treatment, when established, is problematic as to results. Seek for any wounds, injury, and vigorously treat the parts with a strong antiseptic. Keep the patient quiet and in a darkened stable.

MANURE FOR LUCERNE.

"Supposing standard super costs £6 per ton applied to lucerne, what is a ton of stable manure worth when applied?" This question was put by a correspondent, who desired to know the best artificial manure to use as a dressing for lucerne, and the value of well rotted stable manure. In reply, the Director of Agriculture (Professor Arthur J. Perkins) states:—"In the first place I shall state that the yields of a lucerne field, apart from the question of water supply, are directly proportional to the natural fertility of the land. Hence, if the land is naturally poor, heavy crops can be secured only by improving its condition by the systematic use of manures. In this connection, it is quite impossible to compare relatively superphosphate to farmyard manure, for the simple reason that they represent two totally different manures, both of which meet the requirements of a lucerne crop in special directions.

In certain circumstances, farmyard manure brings to the soil a large quantity of organic matter and with it smaller quantities of nitrogen, phosphates, and potash. Superphosphates, on the other hand, bring to the soil phosphates only in a high degree of solubility.

Lucerne, like all leguminous plants, requires an abundant supply of organic matter; consequently, the use of farmyard manure is generally desirable. From the point of view of general practice, however, personally, I much prefer applying farmyard manure prior to sowing the seed rather than at a later stage in the development of the crop.

Farmyard manure is a type of manure, the effects of which extend over a number of years, and if a sufficient heavy application is made from the outset, it may not be necessary to resort to it again during the life-time of the lucerne field. Hence, the best practice in my view consists in breaking the land on a deep furrow 12 months or thereabouts before sowing lucerne and dressing the land heavily with farmyard manure at the rate, say, of 20 to 30 tons to the acre. This manure should be ploughed under and the land gradually worked as bare fallow and subsequently sown to lucerne either in autumn or in spring, according to the district. This dressing should continue effective for a period of 8 to 10 years, and by that time, in most cases the lucerne field should be ploughed up and the land brought under some other crop. But, although this dressing of farmyard manure will suffice, it does not follow that the lucerne field should not receive other dressings from time to time. I suggest that after the second year from the time of seeding in the early spring, a lucerne field should be dressed each year with superphosphate at the rate of 3cwt. to 4cwt. to the acre, and if at all possible, with ½cwt. of some concentrated potassic manure. If, however, no farmyard manure was used at the outset, or an insufficient quantity only, and the land is in need of organic matter, well rotted farmyard manure might be top-dressed over the crop in the early spring in conjunction with superphosphate at the rate, say, of 2cwt. to the acre."

ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on Wednesday, January 12th, there being present Mr. C. J. Tuckwell (Chairman), Captain S. A. White, Messrs. T. H. Williams, A. M. Dawkins, H. Wicks, and H. J. Finnis (Acting Secretary). Apologies were received from Professor Arthur J. Perkins, Messrs. George Jeffrey, F. Coleman, and W. S. Kelly.

On the motion of Mr. Dawkins, it was resolved that a message of sympathy be sent to Mr. George Jeffrey, who had recently met with a serious accident.

Land for Lucerne Growing at Booborowie.—In reply to the Board's suggestion that a small area of land for lucerne growing should be added to the Booborowie Experimental Farm, the Minister replied that he greatly appreciated the suggestion, but that nothing could be done except by resolution of both Houses of Parliament. It was then resolved, on the motion of Captain White, seconded by Mr. Wicks, "That the Minister be asked to move to that effect at an early date in the forthcoming session."

Roads for Settlers in Mallee Country.—In regard to the suggestion of the Nunkeri and Yurgo Branch of the Bureau, "That the Government be asked to provide roads for settlers in mallee lands districts," it was decided to suggest to the Branch that they take steps to establish a district council in the vicinity of Karoonda.

Veterinary Surgeon for Eyre Peninsula.—This matter was again brought before the Board, but it was decided that consideration be postponed until the next meeting.

Clearing Scrub Land.—A resolution was received from the Conference of Eyre Peninsula Branches of the Bureau, "That settlers in mallee hundreds in all parts of the State, and particularly on Eyre Peninsula, be relieved of their obligations in respect to the clearing of scrub, to the extent of the value that they can conserve water." The Secretary stated that he had seen the Secretary of Lands (Mr. E. J. Field) to find out whether the lessees were bound to clear the blocks. It was found that the Land Board considered carefully every block that was leased, and that a portion of it must be cleared within a stated time. Mr. Dawkins moved, and Captain White seconded, a resolution to the effect that the Land Board might be asked to express an opinion on the suggestion.

Commonage for Stock at Moorak.—Regarding the suggestion of the Moorak Branch that a portion of Mount Schank might be purchased for commonage purposes, the Secretary for Lands replied that the land in question had been purchased by the Government. As soon as a survey of the land had been effected, it would be offered in blocks. Portion would probably be reserved for discharged soldiers

and the balance offered under the Crown Lands Act. Moorak settlers would then have an opportunity of applying for blocks, and their applications would be duly considered by the Land Board. It was decided that the Secretary should inquire what Crown lands were available in the district, and communicate the information to the Moorak Branch, with a suggestion that they might inspect the country with a view to ascertaining its value for commonage purposes.

A communication was received from the Moorak Branch of the Bureau in regard to the gift of the Lincolnshire Red Shorthorn Society through His Excellency the Governor to the Government of South Australia of several selected dual-purpose cattle from the herds of their members. The Moorak Branch wished to know what was to be done with these cattle, and whether one could be secured for the district. The Secretary was instructed to advise the Branch that the Board was of the opinion that there was little likelihood that these cattle would be dispersed, but it was thought that they would be maintained as a stud.

Date of Next Meeting.—It was decided that the next meeting of the Board should be held on Tuesday, February 8th.

Agenda Committee.—The Chairman (Mr. C. J. Tuckwell), Professor Arthur J. Perkins, and the Acting Secretary (Mr. H. J. Finnis), were deputed to consider the agenda of the February meeting.

Life Membership.—The name of Mr. Andrew Inkster was added to the list of life members of the Agricultural Bureau.

New Members.—The undermentioned names were approved for addition to the rolls of existing Branches:—Smoky Bay—R. P. Hoar; Blyth—E. H. Lanyon, A. H. Schulz, D. O'Connell; Angaston—J. B. Harris; Myponga—J. Button, H. Rowley; Lucindale—J. K. Foster; Petina—A. C. Trezona, A. Trezona; Williamstown—A. Ross; Blackwood—C. G. Grasby, C. H. Nield; Wirrabara—D. Hoar, R. A. Carr; Berri—C. Carpenter; Barmera—J. K. Middleton, W. J. Elliott, Craig; Black Springs—Siegert, E. Siegert, A. Siegert, R. King, C. Gilbert, R. Hann, A. Burbidge, J. Fisher, R. Fatchen; Williamstown—Mitchell; Glossop—Hadlow, J. Slaven, L. C. Tucker.

Pleuro-pneumonia.—The Chief Inspector of Stock (Mr. T. H. Williams) drew attention to the prevalence of pleuro-pneumonia in the State, and the necessity for stock-owners immediately communicating to the Stock Department information respecting suspected illnesses amongst their cattle. Mr. Williams also mentioned that the operations of unqualified veterinary surgeons were hampering the Stock Department in its effort to eradicate the disease. It was therefore determined, on the motion of Captain White, seconded by Mr. Dawkins, "That the Government be asked to take early steps to provide for the registration of veterinary surgeons.

Injuries to Travelling Cattle.—The attention of the Board was directed to the fact that unnecessary injury and suffering was caused to cattle in transit on the northern railway system owing to the fact that in some of the old type of cattle-trucks there was a slightly

projecting capping-rail which came in direct contact with the buttocks of an average-size beast. The jolting of the train caused bruising and abrasions, and it was thought that by slightly raising the rail referred to these injuries could be obviated. It was decided, therefore, to request the Honorable the Minister of Agriculture to bring this matter under the notice of the Railways Commissioner.

Black Rat.—Captain White drew attention to the fact that the black rat was present in considerable numbers in the Fulham district, and exhibited tomatoes that had been attacked by that animal.

Bacon Factory at Port Adelaide.—Attention was directed to the necessity for developing the bacon industry in this State. The Board had previously recommended that the Federal Government be asked to offer a bonus for the export of pig products. So far this had not met with approval. It was therefore determined that the Manager of the Government Produce Department might be asked to report on the advisability and practicability of establishing a factory for the handling of bacon products for export at the Government Produce Works at Port Adelaide.

ANALYSES OF FERTILISERS.

The following are the results of analyses made by the Government Agricultural Analysts (Messrs. C. E. Chapman and S. D. Shield) of samples of fertilisers taken by assistant inspectors during the year ended December 31st, 1920:—

Name of Firm and Fertiliser.	Phosphate.						Nitrogen.		Potash, K_2O.		Bone Manure, Fine Material.		Phosphate Fertiliser, Fine Material.	
	Water Soluble.		Citrate Soluble.		Acid Soluble.									
	Vendor's Guarantee	Result of Analysis.	Vendor's Guarantee	Result of Analysis.	Vendor's Guarantee	Result of Analysis.	Vendor's Guarantee	Result of Analysis.	Vendor's Guarantee	Result of Analysis.	Vendor's Guarantee	Result of Analysis.	Vendor's Guarantee	Result of Analysis.
Adelaide Chemical & Fertilizer Co., Ltd.—	%	%	%	%	%	%	%	%	%	%	%	%	%	%
*"A" potato manure	20·0	27·6	4·0	2·1	18·0	16·7	1·5	1·6	2·5	2·5	—	—	—	—
*Bonedust	—	—	—	—	40·0	44·8	3·25	3·3	—	—	40·0	‡	—	—
Bone super.	15·0	22·5	15·0	11·8	4·0	9·1	1·6	1·7	—	—	—	—	—	—
*Bone super.	15·0	22·9	15·0	7·7	4·0	8·4	1·6	1·6	—	—	—	—	—	—
Guano super.	27·0	29·0	3·0	2·9	3·0	5·6	—	—	—	—	—	—	—	—
Mineral super.	36·0	37·9	—	—	—	—	—	—	—	—	—	—	—	—
*Nitrate of soda	—	—	—	—	—	—	§15·5	§16·1	—	—	—	—	—	—
S.A. super.	30·6	31·0	—	—	—	—	—	—	—	—	—	—	—	—
Super. B	16·0	21·5	14·0	11·7	4·0	8·1	—	—	—	—	—	—	—	—
Wheat manure	28·0	33·6	5·0	4·1	3·0	5·0	1·05	1·2	—	—	—	—	—	—
Crompton & Son—														
Gardener's friend	—	—	—	—	26·5	28·4	4·25	5·7	—	—	20·0	31·6	—	—
Pure bonedust	—	—	—	—	42·0	45·6	3·5	4·1	—	—	40·0	62·5	—	—
South Australian Fertilizer Co., Ltd.—														
36 super.	36·0	39·5	—	—	—	—	—	—	—	—	—	—	—	—
45 super.	45·0	45·7	—	—	—	—	—	—	—	—	—	—	—	—
†50 phosphate	20·0	25·5	4·0	2·4	26·0	28·5	—	—	—	—	—	—	—	—
*†50 phosphate	20·0	28·5	4·0	3·7	26·0	25·1	—	—	—	—	—	—	—	—
Island guano	—	—	—	—	30·0	31·2	—	—	—	—	—	—	80·0	91·5
Muriate of potash	—	—	—	—	—	—	—	—	52·0	50·9	—	—	—	—

ANALYSES OF FERTILISERS—*continued.*

Name of Firm and Fertiliser.	Phosphate.						Nitrogen.		Potash, K_2O.		Bone Manure, Fine Material.		Phosphate Fertiliser, Fine Material.	
	Water Soluble.		Citrate Soluble.		Acid Soluble.									
	Vendor's Guarantee.	Result of Analysis.	Vendor's Guarantee.	Result of Analysis.	Vendor's Guarantee.	Result of Analysis.	Vendor's Guarantee.	Result of Analysis.	Vendor's Guarantee.	Result of Analysis.	Vendor's Guarantee.	Result of Analysis.	Vendor's Guarantee.	Result of Analysis.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
South Australian Gas Company—														
*"Sagasco" sulphate of ammonia	—	—	—	—	—	—	20·0	20·3	—	—	—	—	—	—
Wallaroo-Mount Lyell Fertilisers, Ltd.—														
Adelaide super. (Y.P.)	30·0	32·1	—	—	—	—	—	—	—	—	—	—	—	—
Guano super.	27·0	30·9	3·0	3·5	3·0	3·6	—	—	—	—	—	—	—	—
L.I.G.E.	28·5	31·1	4·5	5·1	5·0	5·9	0·25	0·25	—	—	—	—	—	—
Wallaroo-Mount Lyell standard super.	36·0	37·3	—	—	—	—	—	—	—	—	—	—	—	—

* Taken from Gardeners' Supply Stores Co-operative Society, Limited.

† The Analyst's (Mr. C. E. Chapman) opinion is that acid soluble phosphate is derived from ground phosphate rock.

‡ Owing to an oversight when forwarding certificate this sample was not tested relative to the percentage of "fine materials." ‡ As nitrates.

January 22nd, 1921.

GEO. QUINN, Chief Inspector of Fertilisers, &c.

DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on February 1st:—

BUTTER.—Since our last report supplies of local butter have kept up remarkably well, and quantities of top grades coming forward have been equal to local requirements, which is very unusual for the time of year. The hot spells during the month affected the quality considerably, also lessened the demand, and there is still a surplus of butter that is going into cold store on account of the Imperial Government contract, but mostly of second and third grades. Values are practically unaltered, prices ruling on a parity with the sale made to Great Britain, which contract does not terminate until the end of March this year. Factory and creamery, in prints, realised 2s. 5d. to 2s. 6½d. per lb.; best separators and dairies, 2s. 4d. to 2s. 6d.; fair quality, 2s. 2d. to 2s. 3½d.; well conditioned store and collectors', 2s. to 2s. 1d.; weather affected lots, 1s. 10d. to 1s. 11d. per lb.

EGGS.—Owing to the shipping strike, and the absence of freight both east and west, much heavier quantities have been placed on the local market, and as the quality is very irregular, prices have suffered considerably. Fresh hen, 1s.; duck, 1s. 1d. per dozen.

CHEESE.—The consignments from the South-Eastern factories have been very substantial, but with good export, coupled with active local trade, market is kept nicely cleared, and values show a penny advance, the range being from 13½d. to 14½d. per lb. for large to loaf.

HONEY.—The forwardings throughout the month have been fairly heavy, but buyers have taken all prime quality offering at 6d. to 6½d. per lb.; second grades slow at 5d. to 5½d. per lb.

ALMONDS.—A few odd lots of last season's have come along, but market at moment is very quiet, buyers awaiting the arrival of the new crop. Brandis, nominally 10d.; mixed softshells, 9d.; hardshells, 4d. to 4½d.; kernels, up to 2s. 2d. per lb.

BACON.—Slight fluctuations have occurred. Supplies have been quite equal to the demand, in fact the sale has been rather slow, no doubt the high prices interfering with the trade. Best factory cured sides, 1s. 6d. to 1s. 6½d.; middles, 1s. 7½d.; hams, 1s. 10d. per lb.

LIVE POULTRY.—As usual during the month of January the numbers marketed have been very light, and not nearly equal to trade requirements. Buyers were in full attendance at each auction, and nice clearances have been effected, with values well maintaining, and good prices are likely to rule for some considerable time. Heavy-weight table roosters realised 5s. 9d. to 8s. 3d.; nice conditioned cockerels, 4s. 3d. to 5s. 6d.; plump hens, 4s. 3d. to 5s. 9d.; light birds, 2s. 10d. to 4s.; ducks, 3s. 6d. to 8s. 2d.; geese, 5s. to 7s. 6d.; pigeons, 8d. each; turkeys, from 1s. 8d. to 2s. 1½d. per lb. live weight for good to prime table birds; fattening sorts lower.

POTATOES.—Supplies of locally grown being marketed are still heavy, and will probably continue for a few weeks yet. There are also fair quantities of Gambiers now coming along, so that stocks are ample for requirements. ONIONS also continue plentiful. Quotations:—Potatoes (new), £6 to £7 per ton on trucks Mile End or Port Adelaide. Onions, £6 10s. to £8 per ton on trucks Mile End or Port Adelaide.

THE AGRICULTURAL OUTLOOK.

Booborowie.—Weather—The month set in very wet, 115 points of rain being registered on the 2nd instant, then cool weather prevailed until about the 16th instant, when conditions gradually grew warmer up to the 25th, and a cool change occurred on the afternoon of the 25th, and very pleasant weather prevailed to the end of the month. Crops—The lucerne fields are looking well after the summer rains. Natural feed is plentiful. Stock, generally speaking, are in good, fat, healthy condition. Miscellaneous—Harvesting operations are practically completed.

Kybybolite.—Weather has been fairly typical, although resorting somewhat to extremes; some very high temperatures being recorded, and also some rather low ones for January. A good inch of rain fell early in the month, which has encouraged a fair growth of hogweed. Crops—Harvesting generally is completed, and crops have turned out fair; some fields have yielded quite high returns of wheat and oats, but the bulk have yielded around a 12bush. average. Natural Feed—There is very fair stubble feed. Stock are mostly in good health.

Eyre Peninsula.—Weather—An exceptionally heavy downpour and thunderstorm on the 1st of the month (269 points) in about half an hour. There has not been any rain since, although we have had several threatening days. Commencement of month was cool for harvesting, but has been very hot towards end of month. Crops—Stripping is completed, but there is still a considerable amount of cleaning to do, which should be cut out within the next fortnight. A considerable amount of bunt about, and some crops badly lodged. Natural feed making green growth since the heavy thunderstorm, but the last two days have caused it to wilt considerably. Stock—All in good condition, and not any disease in evidence. Pests—Grasshoppers were very thick for a fortnight in stubbles when green came after rain, but have disappeared as quickly as they came.

Turretfield.—Weather—The weather during this month has been very changeable. On January 1st heavy rain fell, and 193 points was registered; the weather then gradually became warmer, until January 8th, when the heat was excessive. A cool change came on January 9th, and was followed by very oppressive weather. Crops—The bulk of the wheat has been carted from the fields, but a large quantity of hay still remains. The maize crops were dried off by the very hot weather, and the melons and garden vegetables also suffered. Natural feed has all dried off, and that remaining is of little value; the stubbles contain a nice picking. Stock in fair order. Sheep in some parts are not showing the condition that the feed warrants. Pests—Starlings and sparrows are giving the vinegrowers much trouble; small gardens suffering badly. Miscellaneous—The fallow this year is very dirty on many farms, the weeds having germinated and grown with the summer rains.

EGG-LAYING COMPETITION, 1920-1921.

HELD AT THE PARAFIELD POULTRY STATION, PARAFIELD, UNDER THE DIRECTION OF D. F. LAURIE (GOVERNMENT POULTRY EXPERT AND LECTURER).

(A TWELVE MONTHS' TEST STARTED ON APRIL 1ST, 1920, AND TO TERMINATE MARCH 31ST, 19..

SECTION 1.—LIGHT BREEDS (SINGLE TESTING). THREE PULLETS IN EACH ENTR

Row No.	Name and Address.	Bird No.	Month ending 31/1/21.	Score to Date.	Bird No.	Month ending 31/1/21.	Score to Date.	Bird No.	Month ending 31/1/21.
			WHITE LEGHORNS.						
A	Bertelsmeier, C. B., Kensington ..	1	19	128	2	24	123	3	21
A	McDonnell, G., Auburn, Melbourne	4	22	118	5	22	133	6	De
A	Stacey, R. S., Hamley Bridge ...	7	10	91	8	1	49	9	24
A	Ryan, J., Silvan, Victoria	10	22	124	11	16	149	12	23
A	Moritz Bros., Kalangadoo	13	24	172	14	Dead		15	22
A	Brown, J. P., Ballarat, Victoria .	16	18	95	17	—	65	18	22
A	Rogers, A. H., Richmond, S.A. .	19	21	88	20	Dead		21	12
A	Eckermann, W. P., Eudunda ...	22	21	123	23	14	111	24	22
A	Burton, C. J., Mallala	25	*—	*—	26	*—	*—	27	*—
A	Beythien, E. W., Scott's Creek ..	28	19	71	29	15	67	30	17
A	Moritz Bros., Kalangadoo	31	20	123	32	21	142	33	23
A	James, H. B., Kew, Victoria	34	22	93	35	16	89	36	21
A	Monkhouse, A. J. W,oodside	37	17	104	38	22	130	39	22
A	Crear, H. S., Broken Hill	40	*—	*—	41	20	135	42	24
A	Roantree, W., Broken Hill	43	*—	*—	44	*—	*—	45	16
A	Beythien, E. W., Scott's Creek ..	46	23	110	47	*—	*—	48	*—
A	Hocking, E. D., Kadina South ..	49	*—	*—	50	21	105	51	24
A	Raymoor Poultry Farm, Kilkenny	52	18	85	53	21	111	54	*—
A	Keegan, H. V., Wallaroo	55	*—	*—	56	22	89	57	*—
A	Lampert, Mrs. S., Piccadilly.....	58	19	106	59	22	129	60	22
A	Parsons, E. H., Pinnaroo	61	26	137	62	25	67	63	16
A	Raymoor Poultry Farm, Kilkenny	64	18	138	65	23	144	66	18
B	Stevens, H. J., Broken Hill	1	20	128	2	23	131	3	23
B	Glenelg River Poultry Farm, Mt. Gambier	4	22	170	5	23	170	6	20
B	Willington, Mrs. G., Milang	7	22	124	8	21	108	9	23
B	Rutledge, M., Broken Hill	10	19	141	11	*—	*—	12	24
B	Vercoe, Wm., Bayswater, Victoria	13	18	127	14	24	155	15	*—
B	Stockman, A., Goodwood	16	24	130	17	15	120	18	22
B	Ritter, Wm., Magill	19	23	127	20	20	119	21	21
B	Blake, Mrs. M., Berowra, N.S.W.	22	25	135	23	24	133	24	23
B	Stidston, M., Cheltenham	25	20	119	26	25	160	27	19
B	Bamford, W. H., Glenelg	28	22	141	29	26	176	30	21
B	Windyridge Poultry Farm, Blackwood	31	22	141	32	22	130	33	18
B	Howie, H. H., Mount Gambier ..	34	21	145	35	22	143	36	24
B	Green, A. J., Crystal Brook	37	22	153	38	26	188	39	13
B	Green, F. W. H., Monteith	40	23	171	41	22	152	42	20
B	Rivett, J., Lockleys	43	—	—	44	—	—	45	—
B	Small, E. W., Mount Gambier ..	46	24	108	47	15	108	48	21
B	Herbert, C., Alberton.....	49	22	130	50	24	120	51	26
B	Holmes, F. A., Naracoorte	52	24	117	53	21	111	54	23

* Failed under Regulation 12.

EGG-LAYING COMPETITION—*continued.*

Name and Address.	Bird No.	Month ending 31/1/21.	Score to Date.	Bird No.	Month ending 31/1/21.	Score to Date.	Bird No.	Month ending 31/1/21.	Score to Date.
WHITE LEGHORNS—*continued*									
Green, F. W. H., Monteith	55	21	104	56	22	156	57	26	159
Herbert, C., Alberton.....	58	1	51	59	20	103	60	16	103
Irlwin, A. P., Balaklava.....	61	22	138	62	21	108	63	18	115
Jurris, W., Glanville Blocks.....	64	21	109	65	16	130	66	16	96
Green, F. W. H., Monteith	1	23	123	2	23	134	3	24	132
Holmes, F. A., Naracoorte	4	20	115	5	24	108	6	*—	*—
Axtell, Mrs. J., Glen Osmond....	7	22	115	8	21	125	9	12	103
Finn, H. J., jun., Angaston	10	22	100	11	23	106	12	19	96
Coleman, A. C., Grange	13	22	98	14	25	150	15	8	87
Green, F. W. H., Monteith	16	23	167	17	24	163	18	24	146
Anderson, J., Prospect.....	19	*—	*—	20	*—	*—	21	10	73
Axtell, Mrs. J., Glen Osmond....	22	*—	*—	23	19	104	24	21	107
TWO WHITE LEGHORNS, ONE ANCONA.									
Tester, Geo. P., Naracoorte	25	24	115	26	22	167	27	22	109

TION 2.—HEAVY BREEDS (SINGLE TESTING). THREE PULLETS IN EACH ENTRY.

BLACK ORPINGTONS.									
Lawson, E. A., Camberwell, Victoria	28	13	77	29	16	104	30	14	85
Bertelsmeier, C. B., Kensington..	31	Dead		32	17	126	33	23	147
Shaw, R. R., Crystal Brook	34	17	132	35	13	102	36	18	94
Jarman, T. E., Epping, N.S.W...	37	*—	*—	38	*—	*—	39	14	89
Hogg, R. J., Morphett Vale	40	21	104	41	15	110	42	*—	*—
Shaw, R. R., Crystal Brook	43	19	131	44	14	86	45	13	58
Holmes, F. A., Naracoorte	46	16	81	47	15	76	48	15	95
Buttfield, C. C., Crystal Brook ..	49	15	108	50	*—	*—	51	15	114
Sherill, W. A., Beaumaris, Victoria	52	13	91	53	*—	*—	54	14	73
Eckermann, W. P., Eudunda	55	*—	*—	56	19	122	57	19	97
Lampert, Mrs. S., Piccadilly.....	58	—	100	59	—	93	60	*—	*—
Bansemer, Mrs. B., Beaumont ..	61	18	124	62	22	150	63	18	126
Siebler, J. M., North Broken Hill.	64	*—	*—	65	*—	*—	66	16	166
Holmes, F. A., Naracoorte	1	3	151	2	Dead		3	19	148
Purvis, W., Glanville Blocks	4	17	116	5	Dead		6	6	93
Bertelsmeier, C. B., Kensington..	7	15	171	8	22	134	9	13	121
Tester, G. P., Naracoorte	10	11	98	11	9	78	12	21	125
Kalms, A. G., Neale's Flat	13	Dead		14	14	98	15	12	99
RHODE ISLAND REDS.									
Stacey, R. S., Hamley Bridge....	16	17	90	17	18	86	18	18	113
Stockman, A., Goodwood	19	5	100	20	14	110	21	10	118
RHODE ISLAND WHITES									
Bansemer, Mrs. B., Beaumont ..	22	18	98	23	*—	*—	24	28	145

* Failed under Regulation 12.

SECTION 3.—LIGHT BREEDS (PEN TEST). SIX PULLETS IN EACH PEN.

Pen No.	Name and Address.	Breed.	Eggs Laid for Month Ending 31/1/21.	Total Eggs Laid from 1/4/20 to 31/1/21.
1	Hodges, F., Ballarat North, Victoria	White Leghorns.....	96	973
2	Bertelsmeier, C. B., Kensington	"	97	817
3	Beythien, E. W., Scott's Creek	"	104	685
4	McDonnell, G., Auburn, Victoria ...	"	84	822
5	Bertelsmeier, C. B., Kensington	"	100	749
6	Thompson, E. F., Franklin.....	"	83	756
7	Purvis, W., Glanville Blocks	"	87	797
8	Smith & Gwynne, Gawler South ...	"	59	643
9	Anderson, S., Gawler Railway	"	92	943
10	Eckermann, W. P., Eudunda	"	85	702
11	Beythien, E. W., Scott's Creek	"	73	639
12	George, R., New Queenstown.....	"	87	806
13	Deacon, J. R., Solomontown	"	92	783
14	Alford, Thos., Broken Hill	"	110	984
15	Evans, H. A., Richmond	"	*—	*—
16	Connor, D. C., Gawler	"	89	732
17	Raymoor Poultry Farm, Kilkenny Blocks	"	114	911
18	Lampert, Mrs. S., Piccadilly.....	"	66	588
19	Pool, F. J., North Norwood	"	107	610
20	Woodhead, N., Torrensville	"	89	679
21	Thompson, E. F., Franklin.....	"	84	654
22	Randall, J., Bowden	"	65	480
23	Earle, E., Solomontown.....	"	*—	*—
24	Willington, Mrs. G., Milang	"	82	742
25	Vercoe, Wm., Sefton Park	"	104	923
26	Pugsley, A., Hindmarsh	"	54	531
27	Howie, H. H., Mount Gambier	"	86	757
28	Purvis, W., Glanville Blocks	"	77	702
29	Anderson, W., Kapunda	"	76	584
30	Broderick, P. J., Burra	"	*—	*—
31	Eldridge, J. H., Norwood	"	73	760
32	Pope Bros. & Co., Hectorville	"	87	625
33	Oakey, E., Mannahill	Brown Leghorns	75	622

SECTION 4.—HEAVY BREEDS (PEN TEST). SIX PULLETS EACH ENTRY.

34	Hogg, R. J., Morphett Vale	Black Orpingtons	*—	*—
35	Bertelsmeier, C. B., Kensington	"	*—	*—
36	Eckermann, W. P., Eudunda	"	79	664
37	Lampert, Mrs. S., Piccadilly.....	"	85	666
38	Bertelsmeier, C. B., Kensington	"	73	582
39	Bansemer, Mrs. B., Beaumont	"	87	572
40	Purvis, W., Glanville Blocks	"	*—	*—
41	Siebler, J. M., North Broken Hill....	"	*—	*—
42	Bertelsmeier, C. J., Kensington	"	*—	*—
43	Purvis, W., Glanville Blocks	"	*—	*—
44	Frost, F. W., Wallaroo	Barred Rocks.....	60	479
45	Lampert, Mrs. S., Piccadilly.....	Black Orpingtons	96	910

* Failed under Regulation 12.

THE DIETETIC VALUE OF CEREALS AND THEIR PRODUCTS.

[By W. J. COLEBATCH, B.Sc. (Agric.), M.R.C.V.S., Principal Roseworthy Agricultural College.]

The cultivation of cereals has occupied the minds of farmers in Australia since the earliest days of settlement, and the progress of the Commonwealth has been based largely on the ingenuity and industry of those engaged in the industry. Until recent years, however, discussions upon the subject of cereals have generally turned in the direction of economic production and marketing, comparatively little attention being paid to their composition or relative value as food for livestock. That this important topic should have been more or less neglected in the past is not altogether surprising when we reflect that the value of livestock has only risen to a highly remunerative level within the last 10 or 12 years, and further, that the average market price of hay and grains has not been such as to stimulate enquiry into their relative dietetic values.

The first indication of general interest in the subject arose in connection with dairy farming, and the public addresses of dairy instructors have had a potent influence in arousing a spirit of inquiry concerning the principles of nutrition. With the advent of high prices for meat and grain the possibility of applying similar principles to the feeding of sheep, beef cattle, and pigs quickly presented itself to the more thoughtful members of the farming community, and the enhanced value of land and of all commodities essential to progressive farming have brought us face to face with the necessity for internal economy with a view to reducing the cost of production to the lowest possible limit. Such terms as "albuminoids," "carbohydrates," "balanced rations," and "nutritive ratios" are rapidly becoming part and parcel of a farmer's vocabulary, and the time is not far distant when the stock breeder who is innocent of the elementary principles underlying the economic feeding of animals will be severely handicapped.

It is with a desire to assist in focussing attention on this important matter that the food values of cereals and their products is being brought under your notice. The cereals that we will consider are wheat, oats, barley, and rye, and we will discuss their merits in accordance with the following scheme:—

1. Cereals as green forage and silage.
2. Cereal hay.
3. Cereal grains and mill offals.
4. Cereal straws and cocky chaff.

Cereals as Green Forage.

The green growth of cereals is relished by all classes of farm stock, and when allowance is made for the losses sustained through "sweating" in the stack and the extra demands on the system during mastication and digestion, it is found that the net feeding values of green forage is greater than that of the hay that could have been made from it. There are, however, fairly wide variations in composition according to the variety of cereal and the stage of maturity, as the following analyses show:—

Table I.—Analyses of Cereals in the form of Green Forage.

Green Forage.	Total Percentage of Nutrients in Food.						Digestible Nutrients in Food.				
	Moisture.	Crude Albuminoids.	Fats.	Carbohydrates.	Fibre.	Mineral Matter.	Protein.	Fat.	Carbohydrates.	Fibre.	Starch Equivalent.
	%	%	%	%	%	%	%	%	%	%	lbs.
Oats (early shoots)	83.9	2.3	0.5	8.0	3.8	1.5	1.7	0.4	5.2	2.3	[illegible]
Oats (in flower)	76.8	1.9	0.6	10.4	8.5	1.8	1.4	0.4	6.5	4.9	10[illegible]
Barley (early shoots)	81.0	2.5	0.5	8.8	5.6	1.6	1.8	0.3	6.4	3.1	9[illegible]
Barley (in and after flowering	68.6	2.2	0.5	16.8	9.9	2.0	1.5	0.3	12.1	6.4	16[illegible]
Wheat	77.3	2.4	0.7	11.9	5.9	1.8	1.7	0.5	7.5	3.2	10[illegible]
Rye	76.6	3.0	0.9	10.3	7.5	1.7	2.1	0.5	7.0	4.9	11[illegible]

In explanation of this and subsequent tables it should be noted that the final column gives the number of pounds of starch that are equivalent in food value to 100lbs. of the different foodstuffs referred to. For example, 100lbs. of green wheat are equivalent in nutritive value to 10.2lbs. of starch, whereas it would require 16lbs. of starch to furnish nutriment equal in amount to that contained in 100lbs. of green barley. It is obvious, therefore, that the higher the figure shown in this column the more effective as a foodstuff is the fodder concerned, and under this system, for which we are indebted to Kellner, food materials may be compared one with another on a fairly satisfactory basis.

Referring again to the tabulated figures, it will be observed that the nutritive value of oats and barley in the young stage is considerably lower than at flowering time, and although corresponding figures for wheat and rye are not available, it is a reasonable assumption that similar differences in composition occur. One of the chief reasons for these variations is the fact that in young growth the nitrogenous elements are largely present in a crude, non-albuminoid form, and in this condition they have a much lower nutritive value. It follows from this that by the grazing of cereals sown for fodder or the feeding down

of crops, the amount of nutriment obtained per ton of forage will be considerably below that obtained by "soiling" a full-grown crop. According to the above figures, in the case of barley the yield of available food nutrients will be 66 per cent. more under the latter system. This may be a little above the average variation, but in general it may be said that the increase will range from 25 per cent. to 50 per cent. This is a substantial difference, and is a striking argument in favor of soiling green forage in preference to grazing whenever possible. Wth regard to sheep keep, one has no option in the matter, and early autumn sown green feed or forward crops must be consumed in an immature condition. The choice of cereal for grazing purposes will usually be determined by other factors than nutritive values, and since there appears to be relatively little difference between them in composition during early growth it is as well that this practice should continue. The earliness of rye and its capacity to grow where other cereals would fail will always make it a popular crop to sow for early autumn and winter grazing. It is closely rivalled for this purpose by barley and quick-growing types of oat, such as Cape, Bathurst Early Sunrise, and Early Burt, but the ordinary Algerian and Calcutta varieties are too slow in growth to be useful for early grazing. For late winter and spring growth, however, the later growing oats yield the most satisfactory grazing.

If grown to be soiled for dairy cattle, barley, being the richest in albuminoids, is generally to be preferred. Especially is this so if it be autumn or early winter forage that is wanted, as it is not retarded in its growth by frosts to the same extent as oats. To do well as a forage crop barley must be sown under fairly good conditions, and if well treated there is no cereal that will not give a more generous response. Oats rank next to barley for this purpose, and early sown wheat is practically as good, but the seed is generally more costly, and hence the decision is generally given in favor of oats. Rye, according to the table, is virtually higher in food value than either wheat or oats, but it is not so palatable to stock when full grown, and if allowed to get a little too mature its nutritive value rapidly declines. Hence, rye should be grown only for autumn or winter forage, and except on light or inferior land it should not be given the preference of barley unless practical tests have demonstrated its superiority under any particular set of conditions.

Cereal Silage.

South Australia is one of the few countries in the world where cereals are grown to be used as silage, and this custom has been forced upon us by the vagaries of our climate. The fact that nutritive, succulent, and palatable fodder can be stored in a convenient and relatively

cheap manner by this process has been accepted for many years, but it is only the stimulus of high prices for stock and dairy produce that will enable us to witness the multiplication of silos on a wholesale system.

The departmental scheme now in operation under the Field Engineer is giving a lead in the right direction, and there is reason to hope that in the near future many of our lamb growers in our wheat and sheep districts will make themselves practically independent of early autumn rains by keeping in reserve a store of cereal silage. Silage being succulent is stimulating to the milk flow, and when early sown grazing crops fail through want of rain the lambs can be kept going through the months of April and May by feeding cereal silage to the ewes. I have referred to this matter as it is commonly, but erroneously, held that the silo has no function to fulfil on any but dairying farms.

The composition of well-made silage bears a close resemblance to that of the materials from which it is made. There is a slight reduction in digestible albuminoids and a marked fall in the percentage of carbohydrates. There is also an apparent increase in fat content, but this is not real, but is brought about by the production through fermentation of lactic acid, which dissolves out and is registered with the fats.

On analysis it would seem that barley was the best of the cereals to chaff into the silo, for if cut at the right stage it is seen to have the highest "starch equivalent," but in my experience barley, being hollow in the straw, is more difficult to consolidate than solid or semi-solid wheats, like King's Early or Macaroni types. This leads to the imprisonment of more air, and being soft in the tissues, barley is very susceptible to disorganisation under the influence of bacterial fermentation. The degenerative changes and total losses in weight that result therefrom are not counterbalanced by the higher food value of the green forage, and hence I regard barley as being inferior to any of the other cereals for the making of silage. A mixture of solid stemmed wheat and Sunrise oats would be an ideal combination for this purpose.

Cereal Hay.

Although hay is sometimes made from both barley and rye, it is only in localities where wheat and oats cannot be depended upon that such practice exists. In certain portions of the South-East rye is really the only cereal that can adapt itself to the soil conditions, and in the old coaching days the horses on the overland route were largely maintained on rye hay. In the appended table of food values it will be noticed that the composition of rye hay compares very favorably with that of wheaten hay, and on referring to the final column the food values of these two products are seen to be fairly close. In the case of rye, however, the yield per acre has to be sacrificed by early cutting in order

to secure palatable hay with a high co-efficient of digestibility. If cut at the same stage as wheat it would be tough, fibrous, and indigestible, and under such circumstances it would fall far below wheaten hay in nutritive value.

Barley hay is also relatively rich in nutrients if cut in the milky stage, in fact it is practically equal in value to oaten hay when judged on composition and digestibility, but unfortunately it has weak, thin-walled straws, which dry out very light, and readily break down into dust and cavings when handled. Moreover, the barley beard is a particularly heavy one, and, rightly or wrongly, its presence is regarded as a serious objection by most farmers.

Table II.—Showing Composition of Hay made from Cereals.

		Total Percentage of Nutrients.						Digestible Nutrients.			
	Water.	Albuminoids	Fats.	Carbo-hydrates.	Fibre.	Mineral Matter.	Protein.	Carbo-Fats.	hydrates.	Fibre.	Starch Equivalent.
	%	%	%	%	%	%	%	%	%	%	lbs.
ten (bloom stage)	11.5	7.5	2.4	42.4	30.1	6.1	5.6	1.7	26.7	18.1	35.2
rley (milk stage)	15.0	8.8	2.4	44.9	24.7	4.2	5.7	1.0	28.3	15.4	35.9
heat (bloom stage)	10.3	6.6	0.7	48.5	27.5	6.4	4.0	0.4	29.9	12.9	31.4
heat (standard)	10.0	5.1	0.8	53.5	24.4	6.2	2.8	0.5	33.7	7.9	30.9
heat (over-ripe)	8.4	5.5	1.3	54.8	24.3	5.7	3.3	0.8	33.1	6.0	29.6
e	10.05	6.6	2.2	33.9	42.8	4.6	4.3	0.9	21.4	26.5	28.1

We are fortunately in the possession of some valuable data regarding wheaten hay, and for these we are indebted to the Director of Agriculture and his collaborators at Roseworthy College. In the above table I have quoted their results in order to indicate the changes that occur in a ripening wheat crop. In summary it may be stated that their investigations led them to conclude that whilst the heaviest tonnage would be secured by cutting about a month after full bloom, the quality of hay from a dietetic point of view would be much inferior to that cut a fortnight or so earlier. This is borne out by the above figures, which indicate a marked falling off in the digestibility of albuminoids and fibre, and a progressive decline in starch values.

The relative merits of oaten hay and wheaten hay is not infrequently a subject that comes up for debate at Bureau meetings, and those accustomed to the feeding of horses on sound, clean wheaten hay are loth to believe that any other dry fodder could be made to replace it with advantage. I am afraid, however, that, notwithstanding the many valuable properties of wheaten hay, the outstanding qualities of well-saved oaten hay must place it in the first position. Apart from the fact that chemical analysis and digestion trials combine to give it a higher

value to the extent of 10 per cent. to 15 per cent., there is unquestionably some principle peculiar to the oat plant which has an exciting and stimulating effect on the animal system, and this in itself is sufficient to warrant a preference for oaten hay whenever a choice can be made. For dairy cattle also oaten hay is better than wheaten, as it appears to encourage milk secretion to a greater extent, and when fed in the sheaf to cattle and sheep there is less waste than in the case of wheaten hay.

Musty, bunted, or badly rusted hay should never be fed unless chaffed and steamed, and even then it should be reserved for cattle, and only fed in moderate quantities. Unsound hay if given to horses is very liable to cause serious derangement of the digestive organs, and sometimes heavy losses are sustained.

Cereal Grains.

The cereal grains are the chief source of the concentrated foodstuffs used on the farm. They are composed largely of starch and albuminoids, and they present their nutritive components in an easily digested form. The transference of starch from the leaves and stems to the grains is very rapid during the final stages of ripening, and consequently any restriction to the flows such as may be caused by dry weather, rust, or "lodging" of the crop leads to shrivelling of the grain. Shrunken grain is therefore poorer in starch and relatively richer in albuminoids, and in consequence is a stronger foodstuff than a prime sample. It must not be inferred, however, that all the deteriorated wheat which has been made available by the cleaning up of the wheat stacks is a superior grade of foodstuff to the ordinary f.a.q. standard, or even to the tail grain obtained from the winnower or thresher. In the accompanying table are set out the percentage of nutritive principles contained in cereal grains and their by-products.

Table showing Composition of Grains and Grain Offals.

	Digestible Nutrients.						Total Nutrients.				
	Moisture.	Albuminoids	Fats.	Carbohydrates.	Fibre.	Mineral Matter.	Albuminoids	Fats.	Carbohydrates.	Fibre.	Starch Equivalent.
	%	%	%	%	%	%	%	%	%	%	lbs.
...	13.3	10.3	4.8	58.2	10.3	3.1	8.0	4.0	44.8	2.6	59.7
ey ...	14.3	12.0	2.4	63.7	5.0	2.6	8.8	2.1	56.7	1.1	67.9
at ...	13.4	12.1	1.9	69.0	1.9	1.7	10.2	1.2	63.5	0.9	71.3
...	13.4	11.5	1.7	69.5	1.9	2.0	9.6	1.1	63.9	1.0	71.3
at Bran ...	12.2	16.4	2.6	56.8	8.4	3.6	13.0	1.8	40.3	2.2	45.2
ard ...	10.4	15.3	3.2	64.5	4.3	2.3	12.1	2.5	50.9	2.2	55.2
ers' grains (dry) ...	9.0	21.2	7.5	41.7	16.0	4.6	15.1	6.6	25.0	7.7	50.3
coombs ...	12.0	23.1	1.5	43.6	12.3	7.5	18.5	1.1	31.8	6.8	38.7

The deductions to be made from these data are:—

1. Cereal grains contain from 8 to 10 per cent. of "flesh formers" or albuminoids.
2. The percentage of digestible carbohydrates, which are very largely present in the form of starch, ranges from 45 per cent. in oats to over 60 per cent. in wheat and rye.
3. Oats are relatively rich in fats whilst the others are distinctly poor in this valuable ingredient. It is the presence of so much fat in oats that makes them cause "over heating" when fed liberally in warm weather.
4. The naked cereals have a higher starch value than oats and barley, and the difference will vary according to the thickness of the covering husks.

Cereal Grains Compared.

Rye grain is very similar in composition to wheat, and it ranks almost equal with barley for pork production, but it is not available to us in any quantity, and further the value put upon it as seed for early green feed places it beyond the reach of the stock feeder. Wheat, on the other hand, is plentiful and is admirably adapted for pig feeding. For this purpose it is quite as serviceable as maize, and the quality of the "increase" is superior. To get the best results it should be either crushed or soaked and fed in mixture with barley.

Being relatively rich in proteids wheat is the best of the cereals for growing pigs, and if the price is not prohibitive it should be preferred to barley for this purpose. It has the effect of hastening development without overloading the system with fat and thereby diminishing the appetite. Although horses are particularly fond of it, wheat is a very unsuitable and even dangerous grain to offer them in any quantity. For cattle, however, and in particular for cows in milk it may be used without fear, but the relative values of wheat and bran generally preclude the use of wheat for such purposes, and the higher feeding value of bran is a further argument in favor of the latter.

Barley, being unsuitable as a bread corn, is largely fed to animals, and in some respects it is more serviceable than oats. In warm countries it is often used instead of oats for horses as being less heating, but it does not impart the same powers of endurance, and it loses its relish if fed for a long period. In the production of pork and bacon of first quality, barley is the best of all grains, and when fed with skimmed milk in the proportion of 2½lbs. to 3lbs. of the latter to 1lb. of barley the highest results will usually be obtained. For dairy cows it is rather too fattening and encourages increase in weight at the

expense of milk production if fed heavily, but in conjunction with oats or bran it has given excellent results.

Oats are unsurpassed as grain food for horses and ruminants, and fortunately in normal times they are relatively cheap. The high percentage of digestible fats which they contain makes them particularly suitable for animals that are required for heavy draught or fast work, and the stimulating influence of the husks on the bowel walls aids digestion and assimilation. New oats should be fed with care, as they are apt to cause colic and enteritis. When they are 10 or 12 weeks old they are usually safe, but if delay is impossible the laxative effects may be reduced by mixing with salt and exposing to the air for three or four days. Musty oats are very dangerous, and should never be used unless well scalded. While oats are not an economical grain to feed to pigs, being too rich in fibre, but for milking cows they are quite as good as bran in increasing the milk flow. They are admirably adapted for supplying the needs of growing stock, and when fed to fattening animals they produce meat of the finest texture and quality.

Bran is probably used more extensively than any other cereal by-product. It is richer in flesh formers and minerals than the whole grain, and is therefore very valuable for growing animals and those in milk. In using bran it should be remembered that if pushed too far it makes the butter too soft and, moreover, it has a laxative effect if fed in excess. It is too coarse and fibrous for animals with small stomachs like weaners and slips, but for boars and brood sows it may be given up to half the grain allowance.

The use of pollard is confined to the feeding of pigs and in particular for suckers and weaners. If fed alone to fattening porkers the meat is soft, but this disadvantage is not noticeable if the proportion is kept below 50 per cent. of the grain or meal ration. For other stock bran is far preferable to pollard, and being coarser it acts as a better diluent of the heavy meals which tend to form a heavy pasty mass in the stomach.

There are several other by-products of minor importance except in the vicinity of the place of manufacture. Brewers' and distillers' grains when procurable are best fed to dairy cows, as they encourage deep milking, but they are risky foods to give cows heavy in calf. Up to half a bushel daily is the usual allowance, and if this amount be much exceeded the quality of the milk suffers. Malt shoots have a somewhat similar composition, and are used for the same purpose with good results at the rate of 6-7lbs. daily. The composition of these products and likewise of the offal obtained from oatmeal mills is very

variable, and for his own protection the purchaser should buy on an analysis in which the maximum amount of fibre is stated.

Relative Merits of Cereal for Sheep.

Cereals are fed to sheep either as a maintenance ration in periods of drought or to ewes and lambs in the autumn to promote rapid and unrestricted growth when natural feed is backward and early crops are "hanging fire."

As a maintenance ration wheaten or oaten chaff will doubtless supply the cheapest form of fodder, and the Western Australian experiments have demonstrated that 1lb. per day is sufficient to maintain an ordinary dry ewe in good health. It appears from these trials that even three-fifths of a pound of oats proved inadequate as a substitute for chaff in the absence of roughage to make up the bulk, but on a stubble field this amount sufficed even for ewes heavy in lamb. The obvious deduction is that when dry feed is wanting, chaff must be fed, and that for in-lamb ewes a combination of chaff and grain is required.

It was observed during these trials that the oat ration gave rise to bigger, stronger, and healthier lambs, and in view of the known fact that of all cereals oats are by far the best suited to sheep, this is readily understood. They are assuredly the best grain for milk lambs, and when every effort is being made to secure the advantages of early marketing, they may be fed up to ¼lb. per day at four to six weeks old. This should be steadily increased till the allowance reaches about two-thirds of a pound per head. Lamb creeps must, of course, be provided, and if paddock feed is short, the ewes themselves will probably require ¾lb. to 1lb. of oats daily. This is one of the drawbacks due to our climatic conditions that must be set against the policy of forcing lambs to market by artificial feeding. The earlier a lamb is marketed the better the price, as a rule, the less the risk of losses from disease and parasites, and the more the pastures are conserved in the interests of the later lambs and culls, but these manifest advantages are not to be secured without the risk of heavy expenditure on foodstuffs in unfavorable seasons. Barley is next in value to oats as lamb feed, but it is a long way from being equal to them, and wheat is a little inferior to barley. Either of these, however, can be fed advantageously if combined with oats, or with oats and bran to the extent of half the ration. With lambs, as with most stock, a varied diet is more effective than any single fodder, and where lamb fattening is conducted on a large scale, the general practice is to combine several fodders, such as oats, bran, maize, crushed barley, and oil cake with a view to tempting the appetite and hastening development.

Cereal Straw.

The value placed upon cereal straw as fodder for livestock varies widely in different countries. It is much more appreciated in humid climates than in regions characterised by warm, dry weather. In the cooler districts of Australia, where cereal crops are commonly harvested by means of binder and thresher, the potentialities of clean, bright straw as fodder for sheep and cattle have been recognised to some extent, and the practice of wintering stock in fields containing one or more stacks of threshed straw is based mainly on the desire to furnish a useful and economic supply of bulky dry fodder in conjunction with green forage. Over the greater portion of the wheat-growing areas, however, little attention has been paid to the virtues of straw as a component of stock rations. Except when required for bedding or thatching, straw has generally been regarded as a hindrance to cropping operations, and the quickest means of disposing of it have usually been adopted. It is only in drought years when circumstances compel that consideration is given in these districts to the dietetic value of cereal straw and cocky chaff. In the bounteous seasons that usually follow periods of depression no sustained effort to avert similar disasters in the future is usually made, and this is not infrequently held to be an indication of lack of system and prudence. Before commenting on the force and fairness of this criticism it is well that we should consider the qualities and composition of straw in relation to other foodstuffs.

Growth and Ripening of Straw.

Although straw is deemed a valuable fodder in moist regions, and is more or less neglected in dry areas, it is not to be inferred that a cool climate is essential to the production of highly nutritious straw. On the contrary, it is found that the longer the ripening period the poorer the quality of the straw, and farmers in Northern Europe recognise that, *coeteris paribus,* straw from a spring-sown crop is richer in food elements than that from a winter-sown crop. Clearly, then, climate in so far as it affects growth is not the determining factor.

In the process of ripening changes in composition and quality take place. As soon as the flowers have "set," and grain formation begins, there is a steady flow of nutrients from the leaves and stems of cereal plants to the ears. This, of course, has the effect of enriching the grain at the expense of the nutritive elements in the straw; the latter becomes progressively richer in fibre and poorer in albuminoids, fats, and carbohydrates, whilst the cellulose undergoes a process of liquifica-

tion which renders it woody and indigestible. Two deductions may be drawn from these facts, namely:—

1. The lower portions of the straw are more deficient in food elements than the upper parts, and being coarser and riper, they contain more woody fibre. Stock naturally show a preference for the richer parts, and sheep, in particular, exhibit an unerring sense of discrimination between the fine and the coarse portions. Sometimes the presence of clovers and other herbage in the butts of the sheaves will induce cattle to consume a good amount of the coarse straw, but more commonly it is rejected.

2. The composition and digestibility of straw will depend largely on the stage of maturity at the time of cutting.

From the foregoing statements it follows that the earlier the crop be harvested the richer in food nutrients the straw must be. In illustration of this point Kellner gives the analyses of oaten straw cut at three different stages of maturity, and from the figures here quoted the changes in composition that mark the ripening period are clearly shown:—

Percentage Composition of Oat Straw Cut at Different Stages.

	Crude Protein.	Fat.	Nitrogen Free Extract.	Fibre.	Mineral Matter.
	%	%	%	%	%
Unripe	10.1	1.9	50.6	29.4	8.0
Ripe	4.9	1.2	48.6	37.8	7.5
Over-ripe	4.3	1.4	36.9	49.8	7.6

From these percentages it is evident that straw obtained from crops cut in an immature condition and allowed to ripen off in the stook will be better supplied with food nutrients than straw cut after the crop has been stripped or harvested. Herein lies the explanation of the fact that any interruption in the flow of materials, such as may be occasiond by prolonged spells of dry weather, or the lodging of the crop, leads to the production of straw abnormally rich in food materials.

Composition of Straw.

The chemical composition of cereal straw varies considerably with the class of cereal, and within the limits of a class wide variations occur which appear to be more dependent upon stage of ripeness than on variety, soil, climate, or manuring. Taken as a group the cereal straws are characterised by:—

1. Low percentage of flesh formers.
2. High percentage of fibre.
3. Low digestibility of fibre and other nutrients.
4. Low palatability.

From the subjoined table the different sorts of cereal straw may be compared one with another and also with pea haulm and bean straws. Of the smaller cereals oats stands first, being one-third as rich as barley straw and three times as well supplied as wheat or rye straw in flesh-forming constituents. Next to oaten comes barley straw, then wheaten, and lastly rye straw. The latter, though slightly better on analysis than wheat straw, is too tough, woody, and unpalatable, and consequently is never used as a farm fodder.

Table I.—Shows Percentage Composition of Cereal Straws and Cocky Chaff.

	Total Percentage of Nutrients in Food.						Digestible Nutrients in Food.				
	Moisture.	Crude Albuminoids.	Fats.	Carbohydrates.	Fibre.	Mineral Matter.	Protein.	Fat.	Carbohydrates.	Fibre.	Starch Value.
	%	%	%	%	%	%	%	%	%	%	lbs.
Oaten straw	14.3	3.8	1.6	35.9	38.7	5.7	1.3	0.5	16.5	20.9	17.
Barley straw	14.2	3.5	1.4	35.9	39.5	5.4	0.9	0.5	19.0	21.3	19.
Wheaten straw	14.0	3.0	1.3	31.8	44.0	4.7	0.2	0.4	13.1	22.0	11.
Rye straw	14.3	3.1	1.3	33.2	44.0	4.1	0.4	0.4	12.9	22.0	10.
Pea straw	14.0	9.0	1.5	34.0	35.0	6.5	4.3	0.7	18.5	13.7	16.
Bean straw	18.4	8.1	1.1	31.0	36.0	5.4	4.0	0.5	20.5	15.5	19.
Oaten cocky chaff	13.8	5.0	2.5	41.5	26.7	10.5	1.9	0.8	19.9	13.6	23.
Barley cocky chaff	14.5	2.9	1.5	38.4	29.9	12.8	0.8	0.5	17.3	14.4	24.
Wheaten cocky chaff	16.0	4.7	1.7	37.1	30.4	10.1	1.4	0.5	16.7	14.6	24.
Rye cocky chaaff	14.3	3.5	1.3	29.1	44.1	7.7	1.1	0.4	11.3	22.0	22.

Feeding Value.

Neither manuring nor soil variations affect straw composition appreciably, although it is recognised that soil humus and nitrogenous fertilisers add somewhat to the store of albuminoids of flesh formers. Further it is well established that the finer the stems and the greater the leaf area the more palatable and efficient as a fodder the straw is found to be. In respect of barley, macaroni wheats and some of the heavily bearded varieties of bread wheats, the awns are said to be injurious, particularly to young stock, and the same charges are laid as in the case of hay. Awns certainly are inferior in food value, and may cause aphtha or even lead to actinomycosis in some cases, but if fed in normal amounts these objections are not so important as to justify rejection of well-saved straw on this ground alone. By chaffing and softening prior to feeding straw carrying the harshest of beards may be fed with safety.

Straw then represents a dry, bulky fodder of relatively low nutritive value, and in consequence it can never form more than a portion of the daily ration.

Where mixed farming is practised in cold districts oaten and less frequently barley straw are made to replace partly the hay portion of the winter ration. Cattle and sheep with their capacious stomachs and more complicated digestive systems are best adapted for the consumption of straw, but mature draught horses running at grass can be kept going when well secured fresh clean and sound straw is fed up to 50 per cent. of the hay or chaff allowance. Oaten straw of the best quality is regarded as being more nutritious than coarse second quality grass hay, but on the other hand straw that has been bleached by the sun or impoverished by exposure to rain will have lost most of its dietetic value. Under normal circumstances it is only good quality straw that should be used as fodder, for it must be remembered that a large proportion of the nutritive elements supplied in straw is absorbed in the production of energy for the mastication and digestive processes. In the case of a bulky fibrous foodstuff these processes are lengthy, and consequently the nett gain to the animal from consumption of straw is always low, and if coarse, over-ripened material is fed between 80 and 90 per cent. of the total energy it contains may be spent in the digestion of it.

Notwithstanding this disadvantage, good straw offers a farmer the cheapest means of supplying the bulk of the ration, and unless a feeling of safety is produced the value of grains and grain offals fed in conjunction will be much reduced. To furnish the required bulk with hay is not always possible, nor is it always economical, particularly in the case of grown cattle, when straw is available. For young stock that require a rich dietary none of the cereal straws are very serviceable, being too poor in flesh formers, but on good pasturage well-saved oat straw may be substituted for portion of the hay ration if the amount of grain be increased. In small quantities it may be used for dairy cattle, but if fed in excess it is apt to impart a bitter flavor to the milk and to render the butter tallowy and unappetising.

Cocky Chaff.

This consists of the husks of the grain, together with portions of the straw and leaves, inferior grains, weed seeds, and rubbish. On the whole it is more valuable than straw weight for weight, and is generally better appreciated by stock. Like straw it is low in nutrients and rich in fibre, and it contains a large amount of silica. Oaten cocky chaff is the richest, that obtained from beardless barley

comes next, then wheaten, ordinary barley, and lastly rye. Wheaten cocky chaff is not only more nutritious than that derived from barley, but it is also more palatable to stock, and usually gives better results.

It is mainly as a component of maintenance rations that the fodders under consideration will prove of service, and if judiciously fed in mixture with other foods they can be made to effect a considerable reduction in the annual consumption of hay.

Oaten straw should always be saved for this purpose, even if it has to be cut after the crop is stripped or harvested, and if a good sample of barley or wheaten straw can be secured on a mixed farm the opportunity of obtaining a reserve of dry fodder should not be missed.

I do not mean to imply that all the straw grown on our wheat farms should be stacked for fodder. Much of it would be unsuitable for stock, and moreover would serve a most useful purpose in sheltering the early autumn growth of feed. I see no valid reason, however, why the best quality straw should not be held at the steading and chaffed up for horses and cattle when required. Allowing half the hay ration of horses on light work and those that are being "spelled" to consist of good straw chaff and likewise that of the milking herd, the value of the hay saved even at a low estimate would far more than compensate for the cost of harvesting, and in lean years the reserve stacks would be almost invaluable. Old straw certainly tends to become dusty and flavorless, and is then not relished by stock, but this can be remedied by spraying with a watery solution of molasses or by steaming or scalding. Quite apart from the benefits to be derived from hand feeding straw or cocky chaff, there is the question of establishing straw stacks round the farm so that young horses, cattle, and lambing ewes may have dry feed and shelter available at any time. This, in my view, is a wise policy on all mixed farms, and the practice when widely adopted will go far to improve our lambing percentages and reduce the death rate in our flocks and herds.

LEAF SPOT IN LUCERNE.

Information respecting the treatment of leaf spot of lucerne has been sought by a correspondent, "E. N.," Sevenhills. In reply, the Superintendent of Experimental Work (Mr. W. J. Spafford) has stated that much of the "leaf spot" of lucerne is caused by the fungus *Pseudopeziza medicaginis*, and a practical way to control this disease is to cut the crop frequently, and cart the green stuff off the land as soon as cut. The crop must be cut before the affected leaves begin to fall from the plants, and if then removed from the plot, the diseased parts have not ripened the majority of the fungus spores on the spot where the lucerne can be reinfected.

AGRICULTURAL EXPERIMENTS.—REPORT FOR YEAR 1920-1921.

[By W. J. SPAFFORD, Superintendent of Experimental Work.]

EXPERIMENTS AT HAMMOND.

[Conducted by Mr. T. Griffin.]

Since 1908 Mr. Griffin has conducted wheat-growing experiments at Hammond in conjunction with the Department of Agriculture. These experiments consisted of two series, one dealing with the cultivation of bare fallow and the other the testing of varieties of wheat.

The cultivation plots for the period 1908-1915 inclusive had as their object the testing of the subpacker on the so-called dry farming methods, and for that eight-year period the results showed—(1) That when subpacking is done just before seeding it gives, at Hammond, no increase over land not subpacked. (2) That subpacking the soil at Hammond immediately after ploughing is worth a bushel extra yield over and above that obtained from land not subpacked. (*Journal of Agriculture*, November, 1916.)

As the above-mentioned increase of 1bush. per acre was too costly to produce, the arrangement and treatment of these cultivation plots were altered in 1916, and the scheme then adopted has been continued for the year under review.

Yields from Cultivation Plots.—Hammond, 1916-1920.

The objects of the culivation plots, as now arranged at Hammond, are as follows:—

(1) Comparing the effects of rolling and subpacking on 6in. ploughing.

(2) Comparing the effects of rolling and subpacking on 3in. ploughing.

(3) Testing land cultivated (not ploughed) at ploughing time, and subsequently worked in the same way as ordinary fallow.

(4) Testing the effect of cultivating land in the early autumn and then ploughing it in May.

To date, these soil treatments have given the yields set out below:—

Yields from Cultivation Plots.—Hammond, 1916-1920.

Soil Treatment.	1916.	1917.	1918.	1919.	1920.	Means. 1916-20.
	B. L.	B. L.	B. L.	B. L.	B. L.	B. L.
Ploughed 6in. deep and rolled the same day as ploughed; harrowed within a day or so; cultivated or harrowed whenever crust or weeds render necessary	19 49	12 50	7 32	2 28	23 50	13 18

Yields from Cultivation Plots.—Hammond, 1916-1920—continued.

Plot.	Soil Treatment.	1916. B. L.	1917. B. L.	1918. B. L.	1919. B. L.	1920. B. L.	Mean 1914 B.
2	Ploughed 6in. deep and subpacked the same day as ploughed; cultivated or harrowed whenever crust or weeds render necessary	20 43	11 54	8 16	2 30	22 46	12
3	Ploughed 3in. deep and rolled the same day as ploughed; harrowed within a day or so; cultivated or harrowed whenever crust or weeds render necessary	18 39	12 56	8 10	2 49	23 35	12
4	Ploughed 3in. deep and subpacked the same day as ploughed; cultivated or harrowed whenever crust or weeds render necessary	18 4	11 43	7 58	2 20	22 13	12
5	Cultivated (not ploughed) at ploughing time; cultivated or harrowed whenever crust or weeds render necessary	17 14	10 44	9 46	2 11	17 38	11
6	Cultivated early autumn, ploughed 4in. deep in May; cultivated or harrowed whenever crust or weeds render necessary	—	13 0	8 23	1 55	20 20	*10
	Rainfall	13.42in.	19.47in.	7.97in.	11.28in.	22.93in.	15.0

* Four years only.

80lbs. superphosphates per acre on all plots each year.

Results of Cultivation Plots.

The returns secured from these cultivation plots show for the given years—1916 to 1920:—

1. On 6in. ploughing, rolling gives about equal returns to those received by subpacking, which over the period of eight years from 1908 to 1915 was shown to be an increase in yield of 1bush. of wheat per acre.

2. On 3in. ploughing, rolling gives practically a bushel per acre greater increase than does subpacking the land, and this means that on this depth of ploughing, rolling immediately after ploughing is worth an increase of about 2bush. per acre over and above what is received from land not rolled. (*Journal of Agriculture,* November, 1916.)

3. As rolling can be done for less than 1s. 6d. per acre, this operation, provided it be done soon after ploughing, is a profitable one.

4. Cultivating instead of ploughing does not give returns of wheat at Hammond, equal to those secured by the latter practice.

5. The preparation of a soil mulch, by cultivating the land in early autumn, then ploughing in May, has not, so far, given returns equal to ploughing and packing the land. The four-year averages for the plots are:—(1) 11bush. 40lbs. per acre; (2) 11bush. 21lbs. per acre; (3) 11bush. 52lbs. per acre; (4) 11bush. 3lbs. per acre; (5) 10bush. 5lbs. per acre; (6) 10bush. 54lbs. per acre.

Wheat Variety Tests at Hammond.

Each year since 1908 an assortment of varieties has been compared by Mr. Griffin on ordinary fallow land with a dressing of 80lbs. superphosphtate to the acre. Set out below will be found how these varieties have behaved during the past five years, with the average return secured from Federation for the 13 years, 1908-1920:—

Yields of Varieties of Wheat at Hammond.

Variety.	1916.	1917.	1918.	1919.	1920.	Means. 1916-1920.
	B. L.	B. L.	B. L.	B. L.	B. L.	B. L.
Federation	19 56	9 44	7 5		28 37	13 4
Yandilla King	23 20	9 54	7 9		22 56	12 40
Gluyas	16 9	7 34	7 37	Failure.	28 45	12 1
Queen Fan	18 45	10 8	8 33		15 30	10 35
King's Early	14 13	9 46	8 0		16 44	9 45
Caliph	—	—	8 24		25 59	—

Federation (mean for 13 years, 1908-1920), 10bush. 9lbs.

EXPERIMENTS AT BUTLER.

[Conducted by Mr. C. F. Jericho.]

In 1916, wheat-growing experiments were commenced in the hundred of Butler, having as their objects—(1) The discovery of the most profitable dressing of superphosphate to apply to wheat crops in this particular locality; and (2) the comparing of the returns secured from varieties of wheats on bare fallow.

Manurial Plots at Butler, 1920.

The manurial plots were commenced in 1916, and are permanently pegged, so that each year that the blocks are sown with wheat, each plot will receive exactly the same manuring. This treatment does away with any chance of the plots receiving any benefits from residual fertilisers that they are not entitled to, and the more often the plots are cropped the better will they show the effects of the different dressings of manure.

Below will be found the yields of grain received from the wheat grown in the manurial plots in 1920:—

Yields of Manurial Plots—Butler, 1916-1920.

Plot.	Manure per Acre.	Yield per Acre. Bush. lbs.
1	No manure	10 42
2	½cwt. superphosphate	18 4
3	1cwt. superphosphate	23 13
4	2cwts. superphosphate	25 29
5	3cwts. superphosphate	25 8

Gluyas wheat used in all plots at the rate of 60lbs. seed to the acre

Yields of Manurial Plots—Butler, 1916-1920.

Year.	Plot 1. No Manure. Bush. lbs.	Plot 2. ½cwt. Super. Bush. lbs.	Plot 3. 1cwt. Super. Bush. lbs.	Plot 4. 2cwts. Super. Bush. lbs.	Plot 5. 3cwts. Super. Bush. lbs.	Rainfall.
	Yield per Acre.					
1916	12 12	16 17	16 32	23 32	28 31	15.79
1917	13 30	20 36	23 23	27 48	29 46	20.78
1918	8 8	12 54	14 24	19 53	19 56	9.87
1919	10 14	12 26	15 9	16 42	17 59	10.93
1920	10 42	18 4	23 13	25 29	25 8	14.79
Means	10 57	16 3	18 32	22 41	24 20	14.43

The average returns for the application of various quantities of superphosphate very clearly show the need in the hundred of Butler of what are usually considered comparatively heavy dressings of this form of fertiliser. The following table, however, sets this out much more clearly, and distinctly shows that the use of manure for wheat growing is purely a business proposition—so much increased return for a given outlay. In the calculations, superphosphate is taken at 5s. per hundredweight, and wheat valued at 3s. 3d. per bushel:—

Increased Yields and Net Increased Value of Wheat from the Use of Superphosphate—Butler, 1916-1919.

Manuring per Acre.	Yields, 1916-1919. Bush. lbs.	Increased Yields over no manure. Bush. lbs.	Net Value of Increase per Acre. £ s. d.
No manure	10 57	—	—
½cwt. superphosphate	16 3	5 6	0 14 1
1cwt. superphosphate	18 32	7 35	0 19 8
2cwts. superphosphate	22 41	11 44	1 8 2
3cwts. superphosphate	24 20	13 23	1 8 6

Wheat Variety Tests at Butler.

Besides the manurial plots mentioned above, Mr. Jericho is conducting wheat variety tests, each variety being sown on land that was in bare fallow, at 1bush. per acre with 1cwt. superphosphate. In the table arranged below will be found the yields from the wheat varieties grown at the hundred of Butler for 1917-1920:—

Yields of Wheat Varieties—Butler, 1917-1920.

Variety.	1917. Bush. lbs.	1918. Bush. lbs.	1919. Bush. lbs.	1920. Bush. lbs.	Means. 1917-1920. Bush. lbs.
	Yield per Acre.				
Gluyas	21 24	16 42	14 22	19 1	17 52
College Eclipse	16 43	14 23	16 36	15 22	15 46
Caliph	17 59	12 24	16 31	12 51	14 56
Queen Fan	18 2	10 38	15 40	11 58	14 4
Yandilla King	13 38	11 34	14 43	15 36	13 53
Canaan	—	—	—	12 30	—
Rainfall	20.78in.	9.87in.	10.93in.	14.79in.	14.09in.

Of these varieties, Gluyas was the best yielder this season, with the very satisfactory return of 19bush. per acre, and the only other ones giving even fair returns were College Eclipse and Yandilla King. For

the period 1917 to 1920, Gluyas is the only outstanding variety, being 2bush. per acre per year better than any other tried. The manurial plots conducted on the same farm have clearly demonstrated that a dressing of 1cwt. superphosphate per acre is not sufficient in these conditions, so in all future variety tests 2cwts. superphosphate per acre will be used.

EXPERIMENTS AT YEELANNA.

[Conducted by Mr. I. J. Williams.]

In 1918, arrangements were made with Mr. I. J. Williams, of Yeelanna, to have experimental plots carried out on his farm, and it was decided that manurial plots and a rotation of crops experiment should be conducted there. As some of the plots were to be sown on fallow, the land had to be prepared that year, and the first crops were sown in 1919. The experiments arranged consist of:—(1) Manurial plots, testing different forms of phosphatic fertilisers, and (2) rotation of crops.

Manurial Plots at Yeelanna, 1920.

The manurial experiment consists of 10 1-acre plots, five of which are sown to wheat each year, and the remainder are bare fallowed, and the plots are permanently pegged, and so worked that each time every individual crop is in crop, it receives the same manuring. The yields of grain received from these plots since their inception—1919 to 1920—are set out below:—

Yields of Manurial Plots.—Yeelanna, 1919-1920.

Plot.	Manuring per acre.	1919. Bush. lbs.	1920. Bush. lbs.	Means. 1919-1920. Bush. lbs.
1	1cwt. superphosphate	21 27	14 0	17 43
2	1cwt. basic slag	7 30	11 23	9 26
3	1cwt. bonedust	1 50	9 59	5 54
4	1cwt. super., 5cwts. lime	7 40	13 4	10 22
5	No manure	1 56	7 20	4 38

A good regular germination resulted in all of the manurial plots, and strong healthy growth was made until well on in the spring, when "Take-all" began to be very evident, and this disease played havoc with the crops on plots 3 and 5, and did considerable damage to all of them.

Rotation Plots—Yeelanna.

The rotation of crops experiment at Yeelanna is a four-course series with 5-acre plots, in which two cereal crops are the only ones carted off the land, and is as follows:—Oats, rape, bare fallow, wheat. During its course this rotation will work out as is shown below:—

Plot.	1919.	1920.	1921.	1922.
1	Oats	Rape	Fallow	Wheat
2	Rape	Fallow	Wheat	Oats
3	Fallow	Wheat	Oats	Rape
4	Wheat	Oats	Rape	Fallow

Wheat—2cwt. superphosphate per acre.
Oats—1cwt. superphosphate per acre.

Crops in Rotation Plots, 1919-1920.

Year.	Wheat with 2cwts. Superphosphate. Bush. lbs.	Oats with 1cwt. Superphosphate. Bush. lbs.
1919..	20 1	22 6
1920..	10 44	16 20
Means	15 22	19 13

The yield secured from the wheat crop this year is rather disappointing, for, despite the fact that some of the crop was badly affected with "take-all," the remainder of it was very promising, but, when ready for the harvesting machine, much less grain was found than appearances led us to anticipate.

RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall at the subjoined stations for the month of and to the end of January, 1921, and the average annual rainfall.

Station.	For Jan., 1921.	Av'ge. to end Jan.	Av'ge. Annual Rainfall
Far North and Upper North.			
Oodnadatta	—	0·69	4·73
Marree	—	0·46	6·02
Farina	—	0·51	6·57
Copley	0·03	0·64	8·30
Beltana	0·13	0·71	8·93
Blinman	0·11	1·02	12·52
Tarcoola	0·85	0·37	7·33
Hookina	2·26	0·58	12·65
Hawker	1·99	0·60	12·37
Wilson	1·46	0·62	11·85
Gordon	2·81	0·67	10·43
Quorn	2·23	0·69	13·79
Port Augusta	2·05	0·55	9·42
Port Augusta West	2·12	0·52	9·36
Bruce	2·01	0·49	9·99
Hammond	1·65	0·66	11·36
Wilmington	2·04	0·89	18·06
Willowie	1·89	0·49	11·82
Melrose	1·87	1·27	23·11
Booleroo Centre	1·92	0·82	15·51
Port Germein	2·75	0·65	12·65
Wirrabara	2·07	0·69	19·44
Appila	1·61	0·04	14·90
Cradock	1·80	0·61	10·82
Carrieton	3·02	0·80	12·34
Johnburg	1·39	0·61	10·22
Eurelia	3·16	0·78	13·11
Orroroo	2·28	1·04	13·42
Nackara	2·24	0·71	10·63
Black Rock	1·51	0·74	12·29
Ucolta	1·27	0·80	11·65
Peterborough	1·78	0·83	13·28
Yongala	1·57	0·67	14·13
Lower North-East.			
Yunta	1·02	0·70	8·40
Waukaringa	1·00	0·55	8·15
Mannahill	0·96	0·73	8·51
Cockburn	0·50	0·70	8·03
Broken Hill, N.S.W.	0·05	0·77	9·89
Lower North.			
Port Pirie	1·23	0·61	13·26
Port Broughton	2·12	0·60	14·13
Bute	1·82	0·61	15·55
Laura	1·80	0·70	18·12
Caltowie	2·06	0·67	17·02
Jamestown	1·38	0·65	17·56
Bundaleer W.Wks.	1·76	0·58	17·56
Gladstone	1·84	0·64	16·05
Crystal Brook	2·60	0·63	15·62
Georgetown	1·95	0·66	18·30
Narridy	2·05	0·57	16·43
Redhill	1·98	0·54	16·66
Lower North—*continued.*			
Spalding	1·68	0·56	20·18
Gulnare	1·65	0·60	18·97
Yacka	1·62	0·49	15·27
Koolunga	2·30	0·57	15·73
Snowtown	2·21	0·59	15·87
Brinkworth	2·27	0·43	15·91
Blyth	2·37	0·66	16·55
Clare	1·63	0·85	24·47
Mintaro	1·69	0·54	23·07
Watervale	1·99	0·87	27·48
Auburn	2·05	0·98	17·82
Hoyleton	1·49	0·75	15·82
Balaklava	1·91	0·69	13·14
Port Wakefield	1·72	0·56	13·54
Terowie	1·35	0·72	13·97
Yarcowie	1·26	0·72	13·54
Hallett	1·35	0·71	16·28
Mount Bryan	1·54	0·48	16·38
Burra	1·36	0·76	17·91
Farrell's Flat	1·39	0·73	18·87
West of Murray Range.			
Manoora	1·83	0·54	18·54
Saddleworth	1·53	0·75	19·75
Marrabel	1·63	0·70	19·44
Riverton	1·96	0·76	20·74
Tarlee	1·65	0·76	17·86
Stockport	2·20	0·76	16·36
Hamley Bridge	2·14	0·79	16·52
Kapunda	1·69	0·84	19·85
Freeling	1·85	0·74	17·95
Greenock	2·18	0·75	21·73
Truro	1·89	0·71	20·18
Stockwell	1·83	0·70	20·40
Nuriootpa	2·03	0·75	21·09
Angaston	2·21	0·74	22·54
Tanunda	2·16	0·81	22·33
Lyndoch	2·31	0·71	22·81
Williamstown	2·25	0·86	27·74
Adelaide Plains.			
Mallala	1·73	0·73	16·61
Roseworthy	2·06	0·71	17·37
Gawler	1·54	0·71	19·14
Two Wells	1·38	0·69	15·91
Virginia	1·42	0·71	17·11
Smithfield	1·60	0·48	17·33
Salisbury	1·43	0·73	18·52
North Adelaide	2·04	0·73	21·87
Adelaide	1·59	0·71	21·01
Glenelg	1·52	0·60	18·42
Brighton	2·02	0·58	21·03
Mitcham	1·85	0·81	23·68
Glen Osmond	1·54	0·95	25·73
Magill	1·72	0·80	25·38

RAINFALL—*continued.*

Station.	For Jan., 1921.	Av'ge. to end Jan.	Av'ge. Annual Rainfall
Mount Lofty Ranges.			
Teatree Gully.....	1·87	0·75	27·73
Stirling West	2·12	1·43	46·82
Uraidla	2·15	1·23	44·49
Clarendon	2·00	1·09	33·18
Morphett Vale ...	2·13	0·76	22·90
Noarlunga	2·27	0·59	20·21
Willunga	1·75	0·72	25·82
Aldinga	1·72	0·50	20·22
Myponga.....	1·37	—	—
Normanville	2·10	0·54	20·53
Yankalilla.....	2·27	0·48	22·93
Mount Pleasant ..	2·66	0·79	27·01
Birdwood	2·29	1·04	29·43
Gumeracha	2·25	1·05	33·33
Millbrook Rsvr. ..	1·97	—	—
Tweedvale	2·45	0·97	35·60
Woodside	2·18	0·93	32·05
Ambleside.....	1·95	1·00	34·81
Nairne	1·92	0·92	28·58
Mount Barker	1·81	0·99	31·10
Echunga	1·73	1·03	32·94
Macclesfield	1·55	0·84	30·60
Meadows	1·71	0·97	36·26
Strathalbyn	1·59	0·68	19·28
Murray Flats and Valley.			
Meningie	1·30	0·64	18·77
Milang	1·19	0·64	15·56
Langhorne's Brdg.	1·42	0·43	14·59
Wellington	1·59	0·74	14·82
Tailem Bend	1·74	0·39	14·55
Murray Bridge ...	1·60	0·57	13·98
Callington	1·47	0·69	15·45
Mannum	1·77	0·50	11·51
Palmer	1·84	0·40	15·23
Sedan	1·85	0·52	12·07
Swan Reach	1·01	0·35	10·80
Blanchetown	0·75	0·53	10·26
Eudunda.....	0·90	0·71	17·51
Sutherlands	1·29	0·32	10·90
Morgan	2·15	0·47	9·13
Waikerie	1·58	0·25	9·41
Overland Corner ..	1·45	0·49	11·11
Loxton	1·40	0·35	12·27
Renmark	2·42	0·44	10·92
West of Spencer's Gulf.			
Minnipa	2·58	—	—
Eucla.....	0·07	0·61	10·03
White Well.....	—	0·47	9·24
Fowler's Bay	0·05	0·40	12·11
Penong	0·05	0·34	12·26
Murat Bay	0·19	0·25	10·47
Smoky Bay	0·22	0·28	10·37
Petina	0·57	0·29	12·97
Streaky Bay.....	0·13	0·45	15·09
Talia	0·36	0·27	15·35
Port Elliston	0·24	0·39	16·37
Cummins	1·56	—	—

Station.	For Jan., 1921.	Av'ge. to end Jan.	Av'ge. Annual Rainfall
West of Spencer's Gulf—*continued.*			
Port Lincoln	0·82	0·58	19·83
Tumby	1·40	0·21	14·76
Carrow	1·86	0·25	15.14
Arno Bay	1·42	0·20	13.10
Cowell	1·36	0·42	11.56
Point Lowly	2·73	0·60	11·84
Cleve	1·90	0·42	—
Yorke Peninsula.			
Wallaroo	1·30	0·54	14·11
Kadina	1·57	0·49	15·93
Moonta	1·33	0·51	15.31
Green's Plains	1·85	0·48	15·75
Maitland	1·19	0·58	20·20
Ardrossan	1·13	0·49	13·96
Port Victoria	1·41	0·44	15·34
Curramulka	1·13	0·55	18·31
Minlaton	1·69	0·46	17·70
Brentwood	1·53	0·27	15·44
Stansbury	1·23	0·57	17·08
Warooka	1·60	0·41	17·74
Yorketown	1·62	0·45	17·29
Edithburgh	1·92	0·48	16·58
South and South-East.			
Cape Borda	0·28	0·63	24·96
Kingscote	1·58	0·43	18.92
Penneshaw	1·85	0·59	21·39
Victor Harbor	1·32	0·70	21·56
Port Elliot	1·54	0·65	20·00
Goolwa	1·50	0·65	17·87
Karoonda	0·84	—	—
Mindarie	0·90	—	—
Meribah	1·76	—	—
Pinnaroo	1·36	0·35	15·57
Parilla	0·84	0·38	14·02
Lameroo	0·96	0·51	16·45
Parrakie	0·75	0·36	14·42
Geranium	0·85	0·38	16·24
Peake	1·85	0·45	16·25
Cooke's Plains ...	1·67	0·52	15·00
Coomandook	1·17	0·47	17·75
Coonalpyn	1·19	0·69	17·64
Tintinara	1·65	0·47	18·83
Keith.....	1·06	0·33	18·54
Bordertown	1·29	0·75	19·52
Wolseley	1·58	0·59	18·07
Frances	1·01	0·70	20·10
Naracoorte	1·23	0·80	22·53
Penola	1·10	1·04	26·48
Lucindale	0·92	0·71	22·93
Kingston.....	1·07	0·71	24·51
Robe	1·16	0·77	24·60
Beachport.....	0·82	0·88	27·29
Millicent	1·19	0·97	29·29
Kalangadoo	1·49	—	—
Mount Gambier ..	1·06	1·39	31·65

AGRICULTURAL BUREAU REPORTS:

INDEX TO CURRENT ISSUE AND DATES OF MEETINGS.

Branch.	Report on Page	Dates of Meetings.	
		Feb.	Mar.
Alawoona	*	—	—
Aldinga	*	—	—
Amyton	*	—	—
Angaston	*	—	—
Appila-Yarrowie	*	—	—
Arthurton	649	21	21
Ashbourne	*	12	12
Balaklava	647	—	—
Barmera	‖	—	—
Beetaloo Valley	*	19	19
Belalie North	647	23	23
Berri	*	—	—
Big Swamp	*	19	19
Blackheath	639	—	—
Black Springs	*	21	21
Blackwood	*	19	19
Blyth	*	18	18
Booleroo Centre	*	—	—
Borrika	*	—	—
Bowhill	*	17	24
Brentwood	*	19	19
Brinkley	*	—	—
Bundaleer Springs	*	—	—
Burra	*	22	22
Bute	*	—	—
Butler	*	—	—
Caltowie	*	—	—
Canowie Belt	*	17	24
Carrow	649	22	22
Cherry Gardens	*	—	—
Clanfield	*	1	1
Clare	*	21	21
Clarendon	*	23	23
Claypan Bore	*	16	23
Cleve	*	—	—
Collie	*	—	—
Colton	*	25	18
Coomandook	*	19	—
Coonalpyn	*	—	—
Coonawarra	*	—	—
Coorabie	*	—	—
Cradock	‡	—	19
Crystal Brook	*	19	19
Cummins	649	17	24
Cygnet River	*	—	—
Dawson	*	—	—
Denial Bay	*	—	—
Dowlingville	*	26	19
Edillilie	*	26	—
Elbow Hill	*	—	—
Eurelia			

Branch.	Report on Page	Dates of Meetings.	
		Feb.	Mar.
Frances	*	26	—
Freeling	*	—	—
Gawler River	*	21	21
Georgetown	*	19	19
Geranium	*	26	—
Gladstone	*	‖	—
Glencoe	649	—	—
Glossop	643	—	—
Goode	*	23	23
Green Patch	*	12	9
Gumeracha	*	21	21
Halidon	*	—	—
Hartley	647-9	16	* 23
Hawker	*	22	22
Hilltown	*	—	—
Hookina	639	17	24
Inman Valley	*	—	—
Ironbank	649	19	19
Julia	*	—	—
Kadina	*	—	—
Kalangadoo	*	12	12
Kanmantoo	*	19	19
Keith	*	—	—
Ki Ki	*	—	—
Kilkerran	*	17	24
Kimba	*	—	—
Kingscote	*	—	—
Kingston-on-Murray	*	—	—
Kongorong	*	17	24
Koonibba	*	17	24
Koppio	643	21	21
Kybybolite	*	17	24
Lake Wangary	*	19	19
Lameroo	*	—	—
Laura	*	18	18
Leighton	*	‖	—
Lenswood and Forest Range	*	26	26
Lone Gum	*	—	—
Lone Pine	639	—	—
Longwood	*	—	—
Loxton	*	—	—
Lucindale	*	—	—
Lyndoch	*	17	24
MacGillivray	*	16	23
Maitland	*	5	5
Mallala	*	7	7
Mangalo	*	—	—
Mantung	*	—	—
Meadows	649	16	23
Meningie	*	—	—

INDEX TO AGRICULTURAL BUREAU REPORTS—*continued.*

Branch.	Report on Page	Dates of Meetings. Feb.	Mar.
Meribah	*	16	23
Milang	*	12	12
Millicent	*	5	5
Miltalie	*	—	19
Mindarie	*	7	7
Minlaton	*	18	18
Minnipa	*	—	—
Mintaro	*	19	19
Monarto South	*	—	—
Moonta	*	‖	18
Moorak	*	—	—
Moorlands	*	—	—
Moorook	*	—	—
Morehard	*	19	—
Morgan	*	—	—
Morphett Vale	*	‖	24
Mount Barker	649	16	23
Mount Bryan	*	—	—
Mount Bryan East	*	—	—
Mount Compass	*	—	—
Mount Gambier	*	12	12
Mount Hope	*	19	19
Mount Pleasant	*	—	—
Mount Remarkable	*	—	—
Mundalla	*	23	23
Mundoora	*	21	21
Murray Bridge	643	—	—
Mypolonga	*	16	23
Myponga	*	—	—
Nantawarra	*	17	24
Naracoorte	650	12	12
Narridy	*	12	12
Narrung	*	19	19
Netherton	*	—	—
North Booborowie	*	—	—
North Bundaleer	*	—	—
Northfield	*	16	16
Nunkeri and Yargo	*	6	6
O'Loughlin	†	16	23
Orroroo	*	—	—
Parilla	*	—	—
Parilla Well	*	‖	21
Parrakie	*	—	—
Paruna	*	—	—
Paskeville	..	—	—
Penola	*	5	5
Penong	*	19	19
Petina	641	26	26
Pine Forest	*	—	—
Pinnaroo	*	18	18
Pompoota	*	—	—
Port Broughton	*	18	18
Port Elliot	647–9	19	19
Port Germein	*	—	19
Port Pirie	*	—	—
Ramco	*	21	21
Redhill	*	—	—
Renmark	645	—	—
Riverton	*	—	—
Riverton (Women's)	*	—	—
Roberts and Verran	642	21	21
Rosedale	*	‖	—
Rosy Pine	*	—	16
Saddleworth	*	—	—
Saddleworth (Women's)	*	—	—
Salisbury	*	1	1
Salt Creek	*	—	—
Sandalwood	*	—	—
Sherlock	*	—	—
Shoal Bay	648	19	19
Smoky Bay	*	—	—
Spalding	*	—	—
Stockport	*	—	—
Strathalbyn	*	22	22
Talia	*	14	14
Tantanoola	*	—	—
Taplan	*	—	—
Tarcowie	*	22	22
Tatiara	*	19	19
Two Wells	*	—	—
Uraidla and Summert'n	*	7	7
Veitch	*	—	—
Waikerie	*	—	—
Wall	*	—	—
Wanbi	*	—	—
Warcowie	*	—	—
Warrow	*	—	—
Watervale	*	—	—
Wepowie	*	19	19
Whyte-Yarcowie	*	—	—
Wilkawatt	*	19	19
Williamstown	640–41	—	—
Willowie	*	16	23
Wilmington	*	16	23
Wirrabara	639	—	—
Wirrega	*	—	—
Wolowa	*	—	—
Woodleigh	*	—	—
Woodside	*	19	19
Wudinna	*	—	—
Wynarka	*	—	—
Yabmana	*	—	—
Yacka	*	22	22
Yadnarie	*	‖	23
Yallunda	*	—	—
Yaninee	*	—	—
Yeelanna	*	19	19
Yongala Vale	*	18	18
Yorketown	*	—	—
Younghusband	*	24	24

* No report received during the month of January. ‡ Held over until next month.
† Formal. ‖ Recess.

THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.

If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.

REPORTS OF BUREAU MEETINGS.

UPPER-NORTH DISTRICT.

(PETERBOROUGH AND NORTHWARD.)

HOOKINA, December 23rd.—A discussion took place on the wheat yield. The Wheat Scheme and the sample of the crops just harvested was also discussed.

MIDDLE-NORTH DISTRICT.

(PETERBOROUGH TO FARRELL'S FLAT.)

WIRRABARA, December 11th.—The Chairman (Mr. W. J. Barbary) read a paper "Self Education," and an interesting discussion followed, in which Messrs. Curnow, Woodlands, Pitman, Morcom, and Jericho took part.

LOWER-NORTH DISTRICT.

(ADELAIDE TO FARRELL'S FLAT.)

BLACK SPRINGS.

December 1st.—Present: eight members and six visitors.

CARE ON THE FARM.—Mr. J. Y. Hudd contributed a paper on this subject. Care, he said, should be taken in the selection of seed wheat, and only a superior sample sown. Horses, implements, and harness should also receive consideration in these times of exorbitant prices. A good shed was essential for the implements when they were not in use, and a coat of paint applied to the wooden parts would lengthen their life. A short discussion followed the reading of the paper, in which the members agreed with the views of the writer.

LONE PINE.

December 21st.—Present: 22 members and one visitor.

STACKING HAY.—Mr. F. Hoffmann contributed a short paper on this subject. Before a commencement was made to stack the hay, it was necessary that the waggons and hay frames should be in perfect order, and sufficient forks should also be on hand. The stack should be in such a position that it could be approached from either side. Vine cuttings, he said, were of great value for forming a base for the stack, because they would keep out the damp, and were also mice and rat proof. The quantity of hay to be stacked should first be estimated and the stack marked out accordingly, and the builder should have full control of all hands engaged on the work. If the foundation of the stack was not perfectly level, extra layers should be put down. Round ends would require a few extra layers to keep the stack level around the border. All the sheaves in the wall should be placed on their edge, the binding sheaves to be placed on their flat side and with the butts out. He advised sprinkling salt in the stack, because it would give the hay a good color, was healthy for stock, and would tend to check mice. A good discussion followed the reading of the paper, Messrs. J. Fromm, T. Wallace, M. Ellis, F. Schulz, F. Basedow, J. Warnest, and J. Christian taking part.

WILLIAMSTOWN.

December 17th.—Present: 13 members and four visitors.

SPRAYING OF FRUIT TREES.—Before commencing to spray it was necessary to know something about the spray to be used, the insect or disease to be combated, and the manner in which the spray acted upon it, said Mr. George Brown, in a paper on this subject. Continuing, he said:—"Insect and fungus pests can be divided into two classes, each requiring a different method of treatment. The two classes of insects are those which chew their food with their jaws, such as beetles and the larvæ of moths, and those which seek their food through their suckers, such as the aphides and scales. The easiest way to attack the chewing insects is by poisoning their food. For this purpose there is nothing better than arsenate of lead. This preparation has proved the best remedy for codlin moth, the larvæ of which eats its way into the apple, so that if the apple is coated with an arsenical poison at the time the grub attacks it, the young grub must be poisoned. The success of the spraying for this pest depends on whether the fruit has been properly covered. If the grub once gains an entrance into the fruit, no spray can reach it. The larvæ of the codlin moth do not remain long on the outside of the fruit, therefore it would be difficult to kill them with a contact spray. That explains why kerosine emulsion is not a success against codlin moth. The first spraying is essential, and this should be applied within three or four days after the blossom petals have fallen. The calyx of the apple and pear is then open, but, this, in some varieties particularly, soon closes up, and if the poison has not been placed there previously the larvæ of the codlin moth is given a safe entrance. This is the part of the fruit most liable to attack from the first brood of codlin. As the young fruits at this time grow rapidly, it necessarily follows that portions of the fruit soon become exposed, so that it is important to renew the spraying at fairly short intervals; a fortnight or three weeks separating the first and second spraying, and three weeks or a month the second and third; and with late varieties of apples it is well to apply even a fourth spraying. The second class of insects secure their food by suction. They do not eat the plant tissue or fruit, but by thrusting their proboscis through the outer tissue of the bark, leaf, or fruit, suck the juices. They are usually very sluggish, and generally remain stationary unless violently removed. They cluster thickly upon stems, leaves, and fruit, and can be directly reached with a spray which will kill them by causing suffocation. It will be seen, then, that for sucking insects, such as peach aphis, woolly aphis, red spider, and any of the scale family, a contact spray is the only remedy. Arsenite of lead would be useless. Some of these insects are coated with a sticky, resinous compound, some with a downy covering like wool, and some with a waxy shield, all of which coverings are impervious to water. A spray of a very penetrating nature, driven with sufficient force to break up or dissolve this outer covering, to get the insect beneath, is therefore necessary. Contact sprays mostly used in the orchard are kerosine emulsion, tobacco wash, and red spraying oil, the latter preparation being much used during the winter, its action on the young leaves making it unsafe to use when any foliage is on the trees. In spraying with red oil it is necessary to be very careful in preparing the mixture, or injury may result. The fungus diseases are of two classes. First, there are those which grow upon the surface of the trees, and absorb their food from the superficial cells of the host plants by means of suckers, examples of which are the mildews, of which oidium on the vine is typical. They are termed epiphytic, because the fungus threads grow on the outside of the leaves, and may be destroyed by dusting flowers of sulphur upon them during hot weather, or by spraying with either Bordeaux or Burgundy mixture. Then there is the Endophytic fungus—that which grows inside the plants and leaves, and cannot be reached by any spray. This is best represented by black spot of the apple and pear, curl-leaf of the peach, shothole and scab of the apricot, and also Irish blight in potatoes. It is obvious that to kill these fungi when visible the leaves and fruits must necessarily be destroyed, so that spraying for this class of fungus can only be regarded as a preventive, and to be at all effective should be applied when the spores of the disease are germinating on the outside of the plants, as the spray will prevent the spores, when disseminated over the plants, from germinating and starting fresh outbreaks of disease. The proper time to spray for

black spot on apple or pear, and shothole and scab on apricot, is just when the blossom buds are bursting, and at a slightly later period. Two sprayings are usually given for these diseases, but for curl-leaf, once this disease appears in the leaves, it is useless to spray—the fungus is inside, and cannot be reached. If only a few leaves are affected, they may be pulled off and burnt. A few points to remember about spraying are:—Have a good outfit; one that will give sufficient power to do the work properly, and keep the mixtures well agitated. See that all vessels are properly clean. It is not advisable to mix sprays, though sometimes this is done, arsenate of lead being added to Bordeaux to make a combined insecticide fungicide. Spray on time, with the right material, and of the right strength. See that every portion of the tree has received a thorough dressing, remembering that it is the fruit and the calyx of the fruit that requires attention, and as the fruit grows with the calyx standing upward and outward, it follows that the spray is better applied from above than from below. A tree at the first spraying for codlin moth should be thoroughly soaked from top to bottom, so that every calyx on it is filled. By carefully following these methods it is possible to save 90 to 95 per cent. or more of fruit from the codlin grubs, and it is to the advantage of everyone with fruit-trees to carefully attend to the spraying for the numerous pests that attack them. For curl-leaf on peaches the Bordeaux mixture should be used. The spray should be applied when the trees are coming into blossom, and if very bad, again the next day. For shothole in apricots they could not spray too often. Spray before the blossom came, and then soon after. When trees were badly affected, shothole was difficult to eradicate." A good discussion followed the reading of the paper.

WILLIAMSTOWN.

January 21st.—Present: 11 members and one visitor.

BORDEAU MIXTURE FOR SPRAYING.—Mr. A. Norsworthy contributed a paper on this subject. He said he used a strong solution, namely, 20lbs. bluestone, 20lbs. lime, and 100galls. water with very satisfactory results. When treating for Black Spot he sprayed well into and around the stem when the buds were open because the disease commenced at the stem. Where the locality was drier the strength of the mixture could be reduced to about 16lbs. bluestone and 16lbs. lime to every 100galls. of water, and one good spraying would be sufficient. For apricots the first spraying should consist of about 22lbs. each of bluestone and lime to 100galls. of water, but the second spraying should be reduced to 12lbs. each of bluestone and lime to 100galls. of water.

CO-OPERATION.—Mr. E. D. Powell then read a paper on this subject. Co-operation, he said, if started on correct lines and carried out systematically would prove of great benefit to the fruitgrower generally. The present high cost of production and costly shipping freights prevented the consumer from procuring as much fruit as he desired. Excluding the price of the fruit, it cost 14s. to put a case of South Australian apples on the London market. He was of the opinion that the fruitgrowers should start their own cool storage premises and fruit-drying factories, because the fruit produced in that district was of excellent quality.

On the following day a visit of inspection was paid to the farms of the different members, each member explaining the different varieties of fruit and the methods adopted in combating the various pests and diseases. The Wangalere vineyard and wine cellars were inspected under the guidance of Mr. W. Gilbert, jun. The orchards of Messrs. E. D. Powell, A. J. and W. G. Mitchells, G. Brown, F. E. Rix, A. Springbett, and L. Hammatt were also inspected and the tour concluded with a visit to the garden of the Hon. Secretary of the Lyndoch Branch (Mr. J. S. Hammatt).

WESTERN DISTRICT.

PETINA (Average annual rainfall, 13.19in.)

October 30th.—Present: 11 members and eight visitors.

HOMESTEAD MEETING.—The monthly meeting of the Branch was held at the residence of Mr. E. Keeley. After the members had inspected the stock, Mr. G. Newbon gave an interesting account of the Congress held in Adelaide during

September. The Secretary (Mr. W. L. Schulz) also gave an account of the Minnipa Conference. The members were then driven around the crops, and Mr. Keeley explained each crop as it was inspected. After tea was partaken of the meeting was again opened, when a discussion took place on "Frosts."

CASURINA GLAUCA.

Around the orchard at the Government Experimental Farm, Minnipa, a breakwind of *Casurina glauca* has been planted. At planting, the trees average approximately 6in. in height. They made uniformly good growth, and in their second year some of them had reached a height of 14ft. The general appearance of the plantation is eminently satisfactory.

ROBERTS AND VERRAN.

November 22nd.—Present: nine members.

PREPARATION OF WHEAT FOR MARKET.—Mr. F. Masters contributed a paper on this subject. The standard of wheat for market, he said, was based upon a fair average quality taken from representative samples from the whole of the State

by the Corn Trade Section of the Chamber of Commerce. The farmer should see to it, then, that he produced a sample equal to the standard required. Obsolete and worn-out machinery should be discarded, because it would not clean the wheat properly. Machinery was so designed that any wheat could be thoroughly cleaned to f.a.q. sample. With the harvester the wheat should not be reaped until it was ripe, because unripe wheat was a fruitful source of trouble on account of weevil infection, and was usually docked heavily. Smut or bunt was very difficult to clean out of a sample. Care should be taken to ensure that the seed sown was not infected; it should be thoroughly pickled with bluestone before sowing, and the bags dipped in the solution to prevent reinfection, or the wheat afterwards emptied into super bags that had not been used for grain. He preferred pickling by dipping, and skimming off any balls of bunt, white heads, chaff, &c., thus preventing reinfection in the drill through the bunt balls being broken in the force feed. One of the best preventives was proper selection of clean seed, from which barley, oats, drake, nancy weed, &c., were absent, but it should not be forgotten that without cleaning the land those measures would be ineffective. Proper cultivation of fallow at the right time and keeping sheep on the land to prevent weeds from seeding would assist in the production of a good f.a.q. sample for market. Rust would sometimes prevent the production of a good sample, but by sowing those wheats known to be rustproof, good results could be obtained. During the discussion which followed, Mr. A. T. Cowley believed that the f.a.q. standard was within the reach of farmers, and he regarded obsolete machinery as detrimental to good production. Messrs. A. J. Drayton and H. M. Imhoff thought that the production of wheat above the f.a.q. standard should be encouraged by a slight advance in price.

KOPPIO.—At a meeting of the above Branch a paper entitled "A Few Impressions Abroad" was contributed and discussed by those present.

EASTERN DISTRICT.

(EAST OF MOUNT LOFTY RANGES).

GLOSSOP.

December 22nd.—Present: 13 members.

The meeting took the form of a question box, when several questions were asked by the members and answered by Mr. C. G. Savage (manager of the Berri Experimental Orchard). In answer to the first question he stated that barley and Japanese millet were the best crops for removing salt from the ground; for a cover crop he favored the field pea. Vines, he said, should be staked during the first year where a trellis was not available, and the headlands should be ploughed every year to prevent evaporation and keep down weeds. Olives, he thought, would not be profitable on high ground without irrigation. He recommended growing lucerne at the bottom of the rows, but cautioned against over watering, lest waterlogging or seepage occurred. All copper sprays, such as Burgundy mixture, he said, were preventives against downy mildew. Mr. Savage recommended growing olives, Smyrna figs, or almonds for windbreaks.

MURRAY BRIDGE.

November 16th.

IRRIGATION AND DRAINAGE.—The cultivation of the reclaimed swamp areas of the River Murray was referred to in a paper read by Mr. Lehman, who laid particular emphasis on the need for efficient drainage, without which, he said, successful irrigation could not be carried out. The tendency for saline matter to collect in the land was not the only reason that made drainage necessary, but water that was not removed sufficiently quickly from the land would check the development of crops. A circulating fresh water channel around the back of the reclaimed area would probably be the surest means of checking an inflow of injurious water into the area. The most economical method of irrigating was to grade the land into sections between the channels. Continuing, the paper read:—To obtain perfect results every section should be watered from the

irrigation channel at openings made every 20ft. or thereabouts, the water running and spreading towards the drainage channel. If the block is well divided into sections, every irrigation channel but the first one can be used as a drain-off channel; when the first section has been watered the second irrigation channel is used as drain off channel. When all sections have been irrigated, then the last gate entering the main drain channel running to the pump may be lifted, and all waste water will flow out. The following points should be strictly observed:—Do not persist in trying to obtain good results by not grading. Do not let water flow in one corner of a section, permitting the water to run haphazard down any furrow it meets, filling the block up inches deep, with the object of trying to water the last few yards of high soil on the highest end. Do not then persist in letting this huge body of water soak away into your neighbor's block because you have not constructed drainage channels. Do not try to irrigate with badly constructed and grassy channels. Do not try to water too many acres in one section; you cannot control the water. Do not try to irrigate too late in the day, and go to bed, leaving the irrigation to Providence. Do not pass a huge body of water on to your land inches deep, thereby washing your land poor, putting up the rates for pumping out, getting into disfavor on the settlement, a worry to the water master, and looked upon as something of a fool. Do not think it hard work in preparing your block as a fine example for others to follow.

RENMARK (Average annual rainfall, 10.93in.)

November 25th.—Present: 35 members.

SUMMER FODDERS.—Mr. H. S. Taylor contributed a paper on this subject. "The growing of fodders on their fruit blocks," said Mr. Taylor, had been largely abandoned by the well-established fruitgrowers in Renmark. Presumably they found it cheaper and better to buy chaff and to concentrate on the production of fruit; and a number of them now had "dry" blocks for the growing of hay. But in the early days—and this was especially true of Mildura—it was a very common practice to use a portion of the irrigated blocks for fodders, or even to grow them among the young vine rows. Water was cheaper then and fruit prices were lower, and at Mildura, with the nearest railway station 150 miles away, wheaten chaff was often costly and hard to get. For the new grower, with limited capital, the growing of fodders was still to be recommended, and he was disposed to think that the stock of even the best established grower might often be better for some well-grown green stuff in addition to their chaff. He thought that every young grower would be well advised to set aside an acre or two for lucerne. If he found he could put the land to more profitable use later on, when his block was self-supporting, the land would be all the better for having been under lucerne, and in the meanwhile he would have been saved a good deal of out-of-pocket expense. Till very recently there were growers in Renmark whose horses were fed on nothing but lucerne hay and chaff, and kept in good condition on it. They were men who knew how to handle lucerne, never letting it get old and tough before cutting it, and harvesting it so that the leaves were kept and the hay was always sweet and attractive. His brother, at Curlwaa, was also a man of this type, and during a recent visit to his place the speaker was informed that last year was the first occasion in 10 years when any outlay had been incurred for feed. There were only about 20 acres in the holding, and all of it was under fruit, with the exception of an acre or so in lucerne. Four horses and two cows were kept, but the Curlwaa land was extremely rich and allowed of the growing of crops among trees in a way that he would be sorry to recommend for any ordinary land. For many years Mr. Peperkorn had provided an object lesson of what could be done with a little patch of lucerne in Renmark. For winter green feed, barley or barley and tares was hard to beat, but Algerian oats or oats and tares also gave good results. Berseem had not proved a success on the light sandy soils of the higher levels, but should do well on the box and blue-bush flats. Seed should be sown at the beginning of March (on the lower river, in February). Lucerne was still the king of the summer fodders, but he would not say more about this plant at present. The best time to sow it was in the autumn or early winter, and it was now too late for the spring sowing. Of the annual fodders they would naturally be most interested in those that lent themselves readily to hay making. The millets were suitable for this purpose, though not the

best. The seed should be sown shallow, at a depth of 1in. or 1½in. Generally speaking, he would not recommend the growing of any of the summer fodders except in drills wide enough apart to allow of cultivation. If they had a piece of land however, which they were not proposing to plant next year, or which was subject to flooding, Japanese millet might be broadcasted in it at the rate of 15lbs. of seed to the acre; 8lbs. to 10lbs. if sown in drills 7in. apart. The crop should be cut just before flowering. Pearl or Egyptian millet should be sown in rows 3ft. apart, and cut when about 3ft high. If sown in the early summer it should yield four or five cuts. Broom corn might be sown for the double purpose of the heads and for fodder. It grew very freely, and stock were fond of the stalks. The sorghums commonly did better on the river than either maize or millets. They were much hardier than maize, and would give two or three cuttings, but were not easily converted into hay. Sown in drills of not less than 3ft. apart, 6lbs. to 8lbs. of seed to the acre was required. Early Ambercane was one of the most satisfactory sorts. The best of all the sorghums, and of all the annual summer fodders, was Sudan grass. Other sorghums would give a greater weight at a cut, but Sudan grass would give up to four or five cuttings in a season, and was readily converted into a very palatable and valuable hay, of practically the same feeding value as wheaten hay. If sown in rows 3ft. apart, only from 2lbs. to 4lbs. of seed to the acre was required; from 18in. to 24in. apart, 4lbs. to 6lbs. The crop should be cut when in full bloom. Maize was of little value for hay, but was an excellent green feed, especially for cows. A hand chaff-cutter would be found very useful if maize was to be fed to horses; and this applied equally to the sorghums. The seed should be sown in rows not less than 3ft. apart. In the speaker's own experience, no summer fodders yet introduced into Australia surpassed some of the Egyptian dhouras brought back by Mr. McIntosh, Director of Irrigation. Two varieties of these had proved especially prolific, and one of them, Mogoo Abgaro Abiad, readily attained a height of from 10ft. to 12ft. It was an extremely hardy plant, hardier even than the sunflower, and if desired, the roots could be left in the ground and would yield heavy crops the second season. The habit of growth was very much like that of maize, with sappy stalk and broad leaves, but the plant was much hardier than maize, and would flourish when maize would starve. It was very strange that the seed of this valuable plant had not yet been put on the Australian market. Elephant grass had lately been introduced into Renmark. It was a very free grower, and stock were said to be very fond of it. Teff grass, which was said to make a good hay, had been tried in Renmark, but with only indifferent results. Bits of land, not much good for anything else, might be put into Rhodes or Paspalum grass for perennial pasture. The Rhodes grass made fair hay. It should be sown broadcast at the rate of 8lbs. to 12lbs. of seed to the acre. Through the kindness of Mr. Savage, of the Berri Experimental Farm, he had been able to bring with him seed heads of dhoura and other Egyptian fodders, as also of broom corn, which he would be glad to distribute. There was room for experimental work with many fodders in this settlement, but this was not work the young settler should be expected to do. For all-round purposes he thought they would find Sudan grass the best of all the annual summer fodders. If they had planted all their land with vines or trees, a row, or a couple of close planted rows, of Sudan grass down the centre of the lands would not interfere with the proper cultivation of the block and would yield a surprising lot of feed. All the fodders mentioned could be sown any time between October and January, inclusive.

Some Potboilers:—The growing of grain crops in the orchard was strongly condemned by Bailey, the American horticulturist authority, but crops such as potatoes and beans, properly cultivated, and with sufficient open space round the young trees or vines, were recommended for the first few years. The potato frequently did well on the river, but its successful cultivation called for a good deal of skill, and generally speaking there was not much to be made out of "truck" crops as potboilers. The cow pea did well and required very little attention; the pods made good "French" beans and the seeds good "haricot" beans, and the tops were good fodder. Mangels were worth growing for cows or poultry, and the heads of most of the summer fodders enumerated, especially the dhoura, were excellent for fowl feed, as was also the sunflower. Two vegetables which every blocker might grow were the sweet potato and the Jerusalem arti-

choke. Some people did not like the artichoke, but it was well worth growing, if only for pig feed. All members of the melon and pumpkin families did well on newly broken land.

BARMERA, December 17th.—Mr. Muspratt delivered the first of a series of lectures dealing with the selection and preparation of soils, planting of trees and vines, and general methods of irrigation.

BERRI, December 20th.—Messrs. Milton, Halliday, and Peacock contributed papers on extracts from the *Journal of Agriculture*. Representatives were present from the Barmera, Glossop, and Lone Pine Branches.

SOUTH AND HILLS DISTRICT.

HARTLEY (Average annual rainfall, 15in. to 16in.).

December 22nd.—Present: eight members.

BENEFITS TO BE DERIVED FROM MEMBERSHIP OF THE BUREAU.—In a short paper dealing with this subject, Mr. J. M. Hudd said:—The average man on the land had neither the time nor the money to spend to take a course of training at an agricultural college, but by becoming a member of the Bureau, he could gain a great deal of knowledge relating to scientific methods of up-to-date farming. The Bureau was a channel through which those who wished to improve their education could do so, and each member was supplied with a free copy of the *Agricultural Journal*. The younger men of the district should be impressed with the good that would be obtained by becoming members of the Bureau, for by attending the meetings they gained experience from the older members and would thereby be enabled to avoid some, if not all, of the mistakes that the older men, with less experience, in their younger days had made. To the young men the Bureau stood as an education in public speaking, for though nervous at first, they would after a little practice be able to collect their thoughts, and in time become capable public speakers. Referring to the duties of members, the speaker said they should be punctual and regular in attendance; be prepared to contribute a paper and give friendly criticisms and suggestions to fellow members. The Secretary could do much to make his Branch what it should be, but he could not do everything. He urged the young members to be eager to contribute papers, samples, &c., and receive advice from other members, bearing in mind that they were to take over the responsibilities of the management of the farm at a date that would come all too soon. Mr. D. S. Westwood then read a paper "Fuel from Waste Vegetation."

PORT ELLIOT (Average annual rainfall, 20.33in.)

December 18th.—Present: five members.

THE PINE AND FRUIT INDUSTRIES.—These industries were dependent on one another for their future development, said Mr. W. E. Hargreaves in a paper on this subject. Imported timber was too expensive for cases and he was of the opinion that some of the incorrectly termed waste land should be planted with *Pinus insignis*, where it would grow to perfection. There was considerably more soft wood required than was likely to be grown in the course of the next twenty years. Taking the average yield of each fruit tree in the State as two and a half or three cases each year, approximately 50,000,000 cases would be required annually to market the fruit, but those figures could be reduced to 30,000,000 after allowing for the cases that would be used more than once. He thought the future development of that industry was a matter for Government undertaking, because the average individual could not wait for the return, but if a private man could plant an extensive area, the safety of such an undertaking was assured. If the trees were planted in rows 7ft. apart, and a distance of 7ft. between each row, 890 trees could be planted to the acre. After 20 years they would be worth £1 each, or £890 per acre. Twenty acres of timber, when ready to cut, would pay the labor of planting and looking after 250 acres if properly planted. A much quicker return could be obtained by planting some of the stony ridges and poor class of soil with wattles. If 10 acres of the sheltered spots were planted with fruit trees, a return would be forthcoming until the pines were ready to be cut.

SHOAL BAY.

December 23rd.—Present: four members and visitors.

REAPER, THRESHER, AND HARVESTER VERSUS STRIPPER AND MOTOR WINNOWER.—In a paper dealing with this subject the Chairman (Mr. H. E. Noske) said in considering the relative value of the machinery used in connection with harvesting operations, one should first of all bear in mind the condition of country in which the implements had to work. He was fully cognisant of the fact that the stripper had much to recommend its use in the drier districts of the State, where the value of the cocky chaff as a fodder had to be taken into account, but in their districts the cocky chaff was rarely, if ever, conserved. Under normal conditions the dominating factor in connection with harvesting was economy, and in his opinion the reaper thresher, or harvester, was the embodiment of such an ideal. If the land was very rough it was not advisable to use a reaper thresher. The harvester was more suitable for that class of country, but on sandy land he believed that the reaper thresher was the best implement, and he had proved that that implement was the lightest running harvesting machine that could be obtained, especially when one considered the width of the cut, and the amount of machinery that had to be driven. The harvester could be worked in damp weather so long as the heads could be knocked off the straw, but the reaper thresher would make a good marketable sample when the stripper could not be used. When heavy rain fell during harvesting operations and one had about 1,500 bags of grain to deal with, the farmer was placed at a considerable disadvantage if the wheat was in the heap in the paddock, but with the grain in bags, as would be the case with the harvester, it would not take long to provide dunnage for the stacking of the wheat. The following figures would show the difference in harvesting expenses based on rates ruling for last year's harvest. A farmer cropping 1,500 bags with a harvester or reaper thresher would take about three and a half weeks. Wages at £3 per week, £10 10s.; keep at 15s. per week, £2 12s. 6d.; sewing 1,500 bags

at 2d. per bag, £12 10s.; total expense, £25 12s. 6d. With the stripper the expense would be as follows:—One man stripping for three weeks, £9; keep for same period, £2 5s.; hire of motor winnower at 6d. per bag, £37 10s.; four men for one week to help clean, £12; five hands, keep for one week, £3 15s.; total expense, £64 10s. That would show an amount of £38 17s. 6d. in favor of the harvester or reaper thresher. One would also be able to harvest a down and tangled crop with the thresher in which it would be impossible to do anything with the stripper. An interesting discussion followed.

MOUNT BARKER (Average annual rainfall, 30.93in.)

November 24th.—Present: 42 members and one visitor.

Mr. P. Wise read a paper dealing with "Some Animal Parasites", in the course of which he dealt briefly with the life history of some of the common types of parasites.

ASHBOURNE, December 27th.—The meeting took the form of the annual social. Several members contributed songs and elocutionary items. Refreshments were provided, and a very enjoyable evening spent.

CHERRY GARDENS, December 21st.—The meeting took the form of the annual social, when about 70 or 80 members from neighboring Branches and visitors attended, and a very enjoyable evening was spent.

CHERRY GARDENS, January 18th.—IMPRESSIONS ABROAD.—Mr. M. G. D. Basey contributed a paper on this subject, after which a number of questions were asked by the members and answered by Mr. Basey.

CYGNET RIVER, December 23rd.—Arrangements were made for the forthcoming visit of Mr. Beaumont. Messrs. F. J. Wakelin and J. J. Osterstock exhibited onions and fruits, and gave an outline of the methods of cultivating the same.

HARTLEY, November 26th.—The monthly meeting of the Branch was held at the residence of Mr. F. Lehmann. The subject "How to Make Farm Life More Attractive" was discussed by those present, after which supper was provided by Mr. and Mrs. Lehmann, and a very enjoyable evening spent.

IRONBANK, January 22nd.—A general discussion took place on the subject, "Diseases of Fruit."

MEADOWS, November 24th.—The meeting took the form of a question evening when several questions of interest were asked. Mr. Griggs was advised that a crop of peas, if fed off with sheep, would build up the soil. Members thought that if the land was left rolled it would hold the moisture better. Mr. Anderson was advised to plant potatoes as soon after cutting as possible.

PORT ELLIOT.—January 15th.—Mr. W. E. Hargreaves read a paper "Three Stages of Cultivation," in which he gave an account of farming new land—First, with the primitive implements; second, with the up-to-date machinery; and third, with the manures and crop rotations.

SOUTH-EAST DISTRICT.

GLENCOE (Average annual rainfall, 33.84in.).

November 18th.—Present: 18 members.

HAYMAKING AND STACKING.—Mr. F. A. Telfer contributed a short paper on this subject. The binder, he said, should first be attended to, knives sharpened and the machine well oiled. He would cut oats for hay just before the crop commenced to ripen, but for wheaten hay he would cut it when much greener. When commencing, he advised cutting away from the fence and dropping the sheaves in the crop; these would be just missed by the machine when it was cutting the other way, and would be removed before coming around again. He would commence stooking as soon as there was room, standing the first sheaf straight up and building the others around it, keeping them all as upright as

possible. Each stook should consist of between 16 and 20 sheaves. The hay would then be ready for carting in about a fortnight. He preferred a load of straw for the base of the stack because mice would not be so troublesome. The stack should be built in a dry place and the size marked out before building was commenced. The centre of the stack should be kept full, the sheaves overlapping to about the bands, and those on the outside bound. He preferred square corners, and he would tie the corner sheaves to prevent slipping. The walls should be kept as square as possible until they were about 10ft. high, and then the roof could be commenced by projecting the sheaves about 6in. over the side of the stack, and gradually drawing in and making a step roof. He would bind the sheaves with the heads out because that gave a better pitch for the roof. He would cover the stack with a tarpaulin to keep out the rain. During the discussion which followed Mr. John Riddoch said that he would place the sheaves in the stook with the butts well apart. He did not favor carrying the sheaves with the heads trailing on the ground. In loading the wagon or building the stack, the sheaves of the outside row should be placed on edge because they would pack better. Mr. W. Holloway thought that the stooks should be made long and narrow. Considerable damage was sometimes caused by building large round stooks because they did not dry properly after rain. He built the inside courses of the stack with the heads outwards because it gave the sheaves a better pitch. Mr. H. Childs said that in France the sheaves were stooked two in width and ten in a stook. The Secretary (Mr. G. F. Ferguson) would make the stacks narrow and high to the eaves because there was less roof area and the height would give weight and the mice would not be able to work in it so well.

NARACOORTE (Average annual rainfall, 22.60in.).

December 11th.—Present: 14 members.

The Chairman (Mr. F. A. Holmes) called upon the members in turn to give some hint that would be useful to farmers. Mr. Bray spoke on the best way of fitting a driving bar to a binder. He made a bar from a piece of hickory and found that it worked more smoothly than a new one. Mr. A. B. Feuerheerdt then spoke on hanging a gate. He advised placing an old bag around the pump in hot weather to protect the leather. In reply to a question, Mr. C. Drake said he found Pinkeye potatoes the best to sow for an early yield. The Early Rose variety was also very good. Mr. S. H. Schinckel said that the knotters on binders often caused trouble. He had found that the trouble often occurred in the two joints that closed when working, and if a three-cornered file had been used lightly on it, it would work satisfactorily. When digging post holes, especially in sticky soil, he advised mixing lime in some kerosine to make a thick whitewash and applying it to the spade. After being allowed to dry, it would be found that the spade would bring up the soil much better. In making a line for fencing through a tree that was in the way he advised driving in pegs parallel to the line of fencing before reaching the tree and continuing beyond, then marking out the line of fencing parallel to the temporary line and working up towards the tree. Mr. G. Turnbull stated that a piece of wombat skin would make excellent bearings and washers for a binder. He advised members not to plough too deeply in light soil inclined to be wet. The seed would do better if only just covered. The Chairman (Mr. F. A. Holmes) said that Bordeau mixture would cure curl leaf on mulberry trees. He did not advise feeding calves with milk direct from the separator because they became blown, but if the froth was taken from the milk it would do them no harm. In reply to questions, Mr. Johnstone advised poisoning grubs with balls made of a mixture of arsenic and bran or pollard, making it the same strength as they used for rabbits.

CROWN LANDS.

LANDS TO BE OFFERED SHORTLY.

Additional allotments in the town of Whyalla (Hummock Hill) will be offered at auction at an early date.

Lands in hundreds of Booleroo, Bundaleer, Davenport, Terowie, and Woolundunga, Bowaka, Coombe, Hynam, MacDonnell, Marcollat, Moubulla, Mount Muirhead, Parsons, Pendleton, Senior, Waterhouse, Mount Schank Estate, and Mount Benson Estate.

Full particulars will be published in the *Government Gazette*, and plans will shortly be available on application to the Secretary for Lands, Adelaide.

APPLICATIONS FOR LAND.

Intending applicants for any lands which are open are reminded that application may be made for the whole or any portion of a block. The Land Board has power to allot portion of a block, if considered advisable, and to adjust the purchase-money or rent. If only portion of a block is applied for, deposit of a proportionate amount must be made, and the successful applicant would be required to pay cost of survey.

ALLOTMENTS, SALES, TRANSFERS, SUBLEASES, AND MORTGAGES.

Notice is hereby given that in future no applications for land, or for transfer, sublease, of mortgage of Crown leases or agreements will be approved to unnaturalised persons of *any* nationality, or to naturalised persons of enemy origin unless the consent of the Honorable the Attorney-General of the Commonwealth be first obtained by the parties making the application.

Where any doubt as to nationality exists, it will be necessary for certificate of birth or naturalisation papers to be exhibited.

The same principle will apply to land sold by auction.

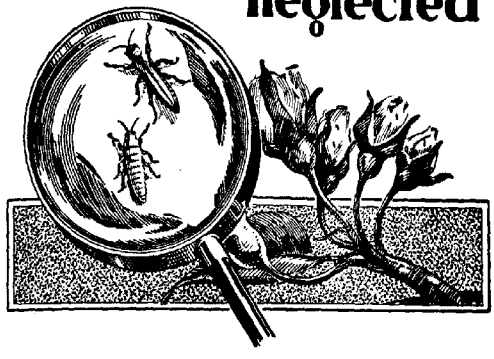
OFFICIAL LIST OF LANDS OPEN.

The attention of intending applicants for land is directed to the Official List of Lands Open, which may be seen at the principal Post Offices, and copies obtained at the Office of the Secretary for Lands. The List shows the Areas, Localities, Prices, &c., of the Sections available and the conditions under which they may be applied for.

G. R. LAFFER,

Commissioner of Crown Lands and Immigration.

Because they are so small they are often neglected



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The SECOND SESSION opens on or about the second Tuesday after the close of the first session and closes on or about the second Friday in October.

The THIRD SESSION opens on or about the second Tuesday after the close of the second session, and closes at the completion of the vintage.

Applications for Prospectus and information should be addressed to—

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